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Portable Gas Generator.

The proprietors claim for the gas generator, illustrated in the accompanying engravings, which they style the "Columbia Portable Gas Generator," that it is superior in cheapness, safety, economy, and durability, to any apparatus heretofore offered to the public. The machine is now on exhibition at 708 Broadway, and will, we understand, be exhibited at the coming Fair of the American Institute, commencing in the early part of September.

The machine has certainly the merit of simplicity, and we are told works well even in cold weather, without the aid of heat, consuming gasoline of the density of 85°, without condensation. In warm weather much heavier fluid may be used.

The machine consists essentially of two parts, an air compresser or forcing apparatus, and an apparatus for charging the air with the hydrocarbon vapor.

A barrel or case, A. Fig. 1, is divided by a diaphragm, B, Fig. 2, into two compartments or chambers, which communicate with each other by means of the pipe, C. The fluid is put into the case through a supply cock, not shown, and rises to a common level in both compartments. In operation this fluid circulates more or less through the pipe, C, between the compartment containing the carburizing apparatus to the chamber containing the air-forcing apparatus. The denser portions of the fluid are, by revolving drums, D, E, Fig. 2, kept constantly stirred up, mingled and vaporized with the lighter portions.

The drum, lettered E, is the air-forcing drum. It consists of a set of buckets extending spirally as shown in Fig. 3, from the hollow shaft, F, Fig. 2. It rotates in the reverse direction from that of an overshot water wheel, and in so doing carries the air which enters the chamber through the pipe, G, under the surface of the fluid. Thence the air passes through the perforations in the hollow shaft and through the shaft into the carburizing chamber, passing out of perforations in the shaft into the buckets of the carburizing drum.

This drum is similar in construction to the other, but it is smaller and has a less number of buckets. In the hollows of these buckets is placed felt, wool, or other capillary and absorbent material, which is kept constantly saturated in passing through the hydrocarbon liquid, and the air in passing out through this material becomes charged with illuminating vapor, or gas. In this state it is passed through the pipe, H, into the chamber, I, whence it is passed to the service. The chamber, I, acts as a storage for the gas, so that enough will be kept therein to supply the burners when winding up the machine.

The carburizing drum has its buckets placed in a reverse position on the shaft to those of the forcing drum or compresser.

The power used to drive the machine is a weight and cord, acting through a shaft, pulleys, and belt. The weight is wound up in the usual manner.

Patented January 1, 1870. For further information address J. C. Dial, President Columbia Portable Gas Light Company, Columbia, S. C., or E. C. Plumer, 708 Broadway, New York city.

Fig. 1

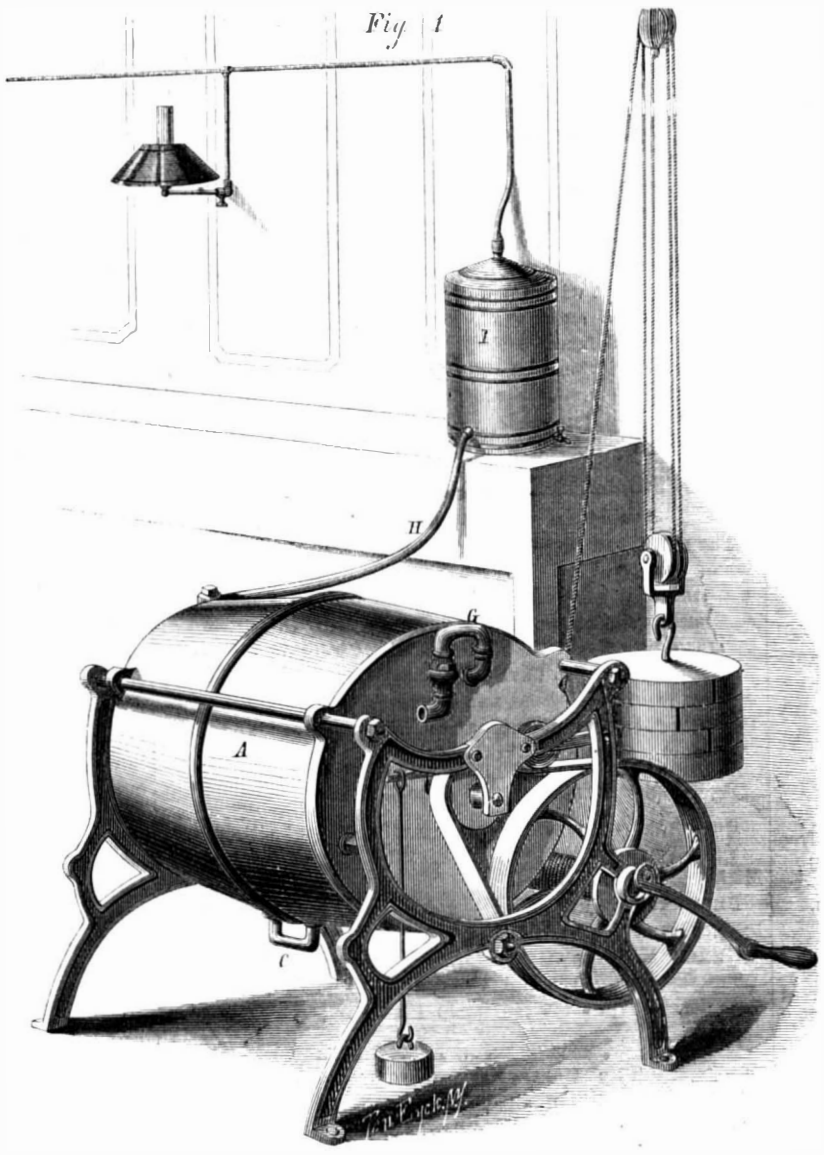
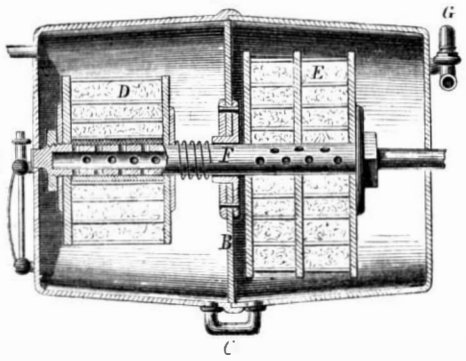


Fig. 3

Fig. 2



RICHARD AND PLUMER'S PORTABLE GAS GENERATOR.

Bleaching Shellac.

The bleaching of shellac is generally effected on a large scale by chlorine or some of its compounds, or by sulphuric acid; the bleached article costs more than twice as much as the unbleached. The bleached shellac is frequently dissolved in spirits of wine for use as a varnish by cabinet makers. This varnish is apt to stain any inlaid metallic ornament upon the furniture, or any metal attached to it, in consequence of the varnish retaining a small proportion of the bleaching compound in solution. Another process of bleaching may be adopted which renders the varnish free from this objection, and very much reduces the cost of the bleached shellac or seed lac. This process consists in the use of animal charcoal as a bleaching powder. It is prepared in the following manner:—Any quantity of yellow shellac, previously broken in small pieces, is conveyed into a flask, alcohol of 0.83 sp. gr. poured upon it, and the whole heated on the hob, or, in the summer, in the sun, until the shellac is dissolved; upon this so much coarsely powdered animal charcoal is added to the solution that the whole forms a thin paste; the flask is closed, not quite air tight, and left so for some time, exposed to the sun; and in eight to fourteen days a small sample is filtered, sufficient to ascertain whether it has acquired a light yellowish brown colour, and whether it yields a clear, pure polish on light coloured woods. If this be the case, it is filtered through coarse blotting paper, for which purpose it is best to employ a tin funnel with double sides, similar to those employed in filtering spirituous solutions of soaps, opodeldoc, etc. The portion which first passes through the filter may be preserved separately, and used as a ground or first polish. Then some more spirit is poured over the charcoal upon the filter, and the solution used as a last coating. The solution of shellac purified by animal charcoal has a brown yellow colour, but it is perfectly clear and transparent; when diluted with alcohol, the colour is so slight that it may be used in this state for polishing perfectly white wood, such as maple, pine, etc., without the wood acquiring the least tint of yellow.

"Nothing New under the Sun."

Photography only adds another instance to the many on record which prove the truth of Solomon's saying: "The thing that hath been is that which shall be, and there is no new thing under the sun."

Humboldt, in his *Cosmos*, states that the Chinese had magnetic carriages with which to guide themselves across the great plains of Tartary, one thousand years before our era, on the principle of the compass. The prototype of the steam engine has been traced to the æolipyle of Hero of Alexandria. The Romans used movable types to mark their pottery and indorse their books. Mr. Layard found in Nineveh a magnifying lens of rock crystal, which Sir D. Brewster considers a true optical lens, and the origin of the microscope. The principle of the stereoscope, invented by Professor Wheatstone, was known to Euclid, described by Galen fifteen hundred years ago, and more fully in 1599 A. D., in the works of Baptista Porta. The Thames Tunnel, thought such a novelty, was anticipated by that under the Euphrates at Babylon; and the ancient Egyptians had a Suez Canal. Such examples might be indefinitely multiplied, but we turn to photography. M. Jobard, in his "*Nouvelles Inventions aux Expositions Universelles*," 1857, says a translation from German was discovered in Russia, three hundred years old, which contains a clear explanation of photography. The old alchemists understood the properties of chloride of silver in relation to light, and its photographic action is explained by Fabricius in "*De Rebus Metallicis*," 1566. The daguerreotype process was anticipated by De la Roche in his "*Giphantie*," 1760, thought it was only the statement of a dreamer.

In Dr. Hooper's Rational Recreations," 1774 is the following method of writing on glass by the rays of the sun. "Dissolve chalk in aquafortis to the consistence of milk, and add to that a strong dissolution of silver. Keep this liquor in a glass decanter, well stopped. Then cut out from a paper the letters you would have appear, and paste the paper on the decanter, which you are to place in the sun, in such a manner that its rays may pass through the spaces cut out of the paper, and fall on the surface of the liquor. The part of the glass through which the rays pass will turn black, and that under the paper will remain white."

In 1802, Thomas Wedgewood and Sir Humphry Davy contributed to the *Journal of the Royal Institution* a paper on "An Account of a Method of Copying Paintings upon Glass, and of making Profiles by the Agency of Light upon Nitrate of Silver." Let us take an extract or two from this paper, first reminding our readers that Daguerre did not announce his invention till 1839. "White paper or white leather," says the memoir, "moistened with solution of nitrate of silver, undergoes no change when kept in a dark place; but on being exposed to the daylight speedily changes color, and, after passing through different shades of gray and brown, becomes at length nearly black. The alterations of color take place more speedily in proportion as the light is intense. When the shadow of any figure is thrown upon the prepared surface, the part concealed by it remains white, and the other parts speedily become dark. For copying paintings on glass, the solution should be applied on leather; and in this case it is more readily acted on than when paper is used. The copy of a painting, or the profile, immediately after being taken, must be kept in an obscure place." The instruments Wedgewood and Davy used were the camera obscura and the solar microscope; the images produced, however, by the former, were "found too faint to produce in any moderate time an effect upon the nitrate of silver." Davy says: "Nothing but a method of preventing the unshaded parts of the delineations from being colored by exposure to the day is wanting, to render this process as useful as it is elegant."—*Eclectic for September.*

Boiler Explosion.

The boiler of a steam tug, the *Carrie*, went off on the 11th instant, scalding the engineer severely. On inspection, it was found that a soft patch had been inserted, that the iron was quite rotten, and in many places corroded down to a sixteenth of an inch in thickness.

The unusual capability of this boiler, as a means of scattering death and destruction, will be obvious to our readers; and they will feel sure that it had been declared safe by a government inspector. This was the fact; the examination took place in August, 1870, and the boiler was certified as being capable of carrying sixty pounds of steam. This is an additional testimonial to the value of our system of boiler inspection, and to the capability and knowledge of the inspectors. A few more such occurrences will convince the New York public that the question is really worthy of consideration and attention.

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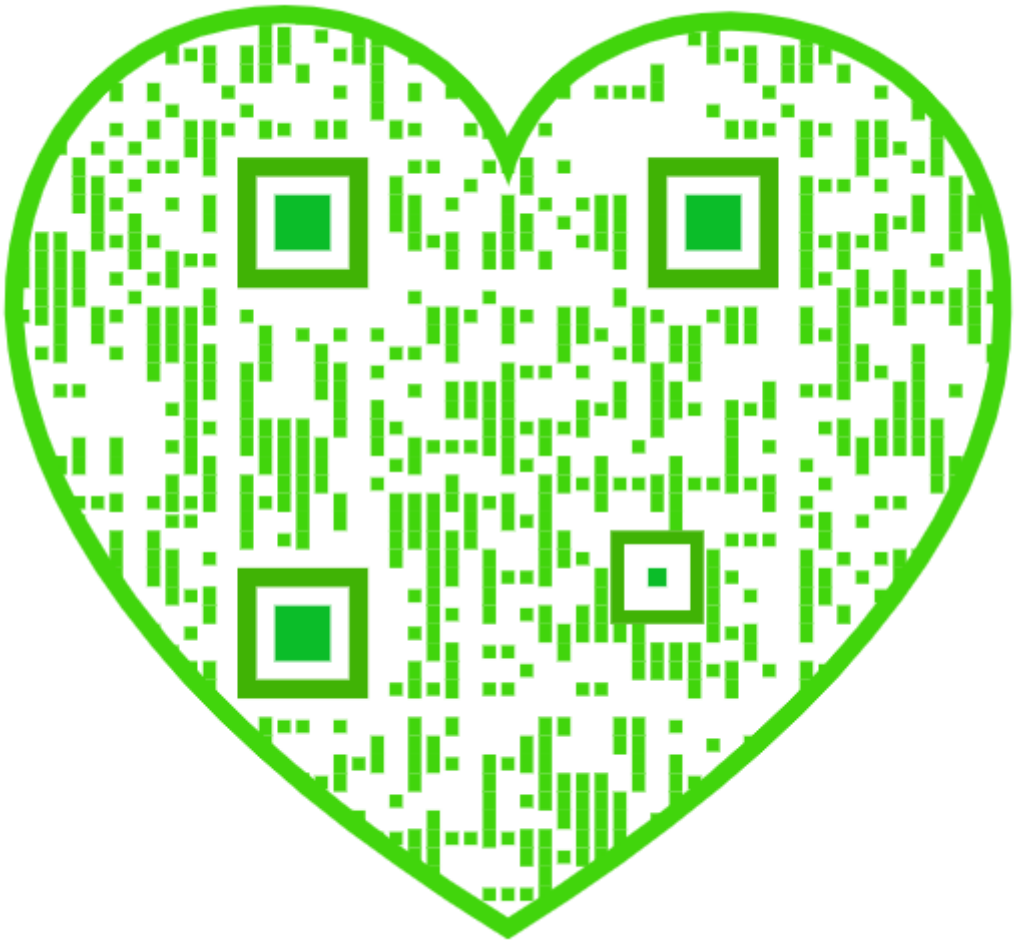

The Reading Room of the British Museum.

[Condensed from *All the Year Round.*]

Over the entrance of the great reading room of the British Museum is appropriately placed the bust of the late Mr. Panizzi—the founder, as he may be called. The huge domed hall behind him, his work and monument, is one of the wonders of Europe, now reaching to a considerable number.

The entrance to this hall is beset with difficulties. At the gate of the museum, on a day when the reading room only is open, the policeman and warders challenge the visitor with a "Reader, sir?" Allowed to pass, he crosses the open space, ascends the steps, enters under the portico, and finds himself at the great hall, with more police and warders. Any signs of indecision, and he is sure to be challenged, "Reader?" If he crosses boldly, and makes for the glass door, where there is another janitor with a list, he is stopped once more, and made to show his passport, unless he have what is called at the theatres "a face admission." Down the long passage he goes, gives up great coat, stick, umbrella, parcels; passes through glass swinging doors, past other detectives, and finds himself in the monstrous cathedral dedicated to learning, and, as some say, also to idleness.

It would be hard to give an idea of the first *coup d'œil;* for there is literally nothing like it. It has the look nearly of a cathedral, with all the comfortable, furnished air of a "snug" library. Coloring for the sides is furnished by rows of the books themselves, which run round the walls to a hight of some forty or fifty feet, and are reached by two light galleries. In the center of the room is a round counter, within which sit the officials, and which communicates with the library outside by a long avenue shut in by glass screens. Outside this counter is another, which holds the enormous catalogue, reaching to some hundred volumes; and from this second counter radiate the desks for the readers. Nothing more comfortable or convenient can be conceived. You have a choice in seats even: hard smooth mahogany or softly cushioned; both gliding smoothly on castors. In the upright back of the desk is a little recess for ink and pens, steel and quill; and on each side a leathern handle. One of these pulls out a reading desk, which comes well forward, and swings in any direction, or at any hight: the other forms a ledge on which books can be piled up and be out of the way. A blotting pad, paper knife, and convenient pegs under the table for putting away hats, etc., complete the conveniences. There are over five hundred of these, each having a number and letter. There are, besides, a number of what might be called "research" tables—small, low, flat, and broad, which an antiquarian may have all to himself; and the lid of which lifting up, he finds a convenient repository, where he can store away all his papers, notes, and books until he returns the next day. Some of the more retired of the long benches are reserved "for ladies only;" but they do not seem very much to care for such seclusion.

Round the room, and within easy reach, is a sort of free library, where every one can help himself. This, as will be imagined, consists of books of general reference, and is very judiciously chosen. It comprises dictionaries of all languages, the best, newest; encyclopædias of every conceivable sort; long lists of the old magazines, like the "Gentleman's," "Annual Register," etc.; ambitious collections of universal science and knowledge, such as the "*Panthéon Litteraire,*" and "Didoret's Encyclopædia;" histories of towns and counties in profusion, and the best and most favorite text books in the respective classes of law, theology, medicine, mathematics, physiology, etc. The only weak place is the class of English *belles lettres* and biography, which is ordered after a very random and arbitrary fashion, comprising such poor books as "Beattie's Life of Campbell," but not "Moore's Life of Sheridan," having "Twiss's Life of Eldon," and no "Life of Sterne," and being without Mrs. Oliphant's remarkable "Life of Irving." In fact, it would be hard to say on what principle the choice is made.

Having chosen a seat—and if you come late in the day you have to take a long, long walk seeking one—go to the catalogue for your book. And here we may pause to survey this wonderful catalogue, a library of folios in itself Every volume is stoutly bound in solid blue calf, with its lower edges faced with zinc, to save wear and tear from the violent shoving in of the volumes to their places. On every page are pasted about a dozen neatly lithographed entries, and between the pages are guards, so as to allow fresh leaves to be put in, as the catalogue increases. As the guards are filled up, the volume is taken and rebound with fresh guards, so it becomes an illustration of the famous Cutler stocking, with this difference, that the stocking is gradually increasing in size. Nothing can be fuller than the arrangements for this catalogue, as it even refers you for a biographical notice of a well known man to some of those little meagre accounts prefixed to collections of their poems, and to biographical notices and reviews. It also, to a great extent, helps the student to the real names of those who have written under assumed ones. This is the new catalogue, but there is an old one partly in print and partly in manuscript, and both must be consulted if you wish to make your search exhaustive. Periodical publications make a department in themselves under the letter P, filling some twenty folio volumes, to which there is an index, also in many folio volumes. London has nearly one folio to itself, Great Britain and France each several. Every entry is complete, title in full, date, place of publication, and a press mark, such as $\frac{645 \text{ a } 10,}{3}$ which is to be copied on a little form containing the rules to be observed, with blanks for name of book, date, etc.

Having given in the ticket, the reader may return to his place, certain of having to wait at least half an hour, and he may amuse himself by watching the smooth running carts laden with volumes, which arrive every moment, and the attendants who are seen hurrying along through the glass screen, each with his pile of books, with their labels fluttering. Considering that some of these have to walk three quarters of a mile along passages and up steep stairs to fetch some remote book, and that often the forms are imperfectly filled, the delay is not surprising. A more intelligent, willing, and obliging class of men cannot be conceived, always ready to volunteer assistance, even outside their special duty. It is pleasant to see how they exert themselves for novices, or for certain old veterans, filling up their forms for them.

The readers are a very singular and motley class. And here it is that some reform is wanting. A great deal of the time and trouble of the staff is taken up with supplying the wants of young boys and girls, and general idlers, who come to read novels and poetry, and take up the places of others who have real business. It cannot be supposed that the nation meant to pay for books and attendants, merely to wait on this useless class. A reform in the way of classification would be useful, the putting these drones in a department of their own, and with one attendant only to wait on them all. Every book ought to be procured within ten minutes, and by a system of speaking tubes and small lifts, the matter could be much simplified. The Museum would run fewer risks from the abstraction of books, by limiting the number of readers. There are many traditions in the Museum of these robbers, some of whom were always suspected, but to whom the matter never could be brought home: while there was a "gentleman" who was not suspected, but was at last discovered. A Museum book is fortunately very unmarketable, it is so stamped all over; and if a volume had two hundred illustrations, every one would bear this mark. To all libraries come people with a mania for cutting out prints, and at this one, on a stand made purposely, are exhibited two maimed and defaced books, thirty or forty leaves torn out, with an inscription explaining how they were placed there as a warning, etc. This exhibition is a little undignified, and it seems quite purposeless. The evil doers would only chuckle at it, while the well conducted have no need of such reminders.

American Association of Science.

The recent meeting of the Association at Indianapolis was one of considerable interest, so far as the discussion of papers was concerned, and quite enjoyable for other reasons. The members were very hospitably entertained by the citizens of Indianapolis. Some 250 of the members went on an excursion to the Mammoth Cave in Kentucky.

We give in our present number, under separate headings, an outline of some of the papers that were read, and shall from time to time present others.

The following officers were appointed for the ensuing year:

PRESIDENT—Prof. J. Lawrence Smith, of Louisville, Ky.

VICE PRESIDENT—Prof. Alex. Winchell, of Ann Arbor, Mich.

PERMANENT SECRETARY—Prof. Joseph Lovering, of Cambridge, Mass.

GENERAL SECRETARY—Prof. E. S. Morse, of Salem, Mass.

TREASURER—William S. Vaux, of Philadelphia, Pa.

AUDITING COMMITTEE—Messrs Eustis and Wheatland, of Massachusetts.

The Perturbation of Forces.

This was the title of a paper read before the Association by James D. Warner, of Brooklyn, N. Y. He thought that time was an important element in effecting the change in the character of force. The impact of bodies in motion, if little or no time was expended in changing the direction of that motion, changed its character instead, and made it heat. He believed that the attraction and repulsion of atoms were not the *plus* and *minus* of the same force, but two distinct forces having opposing lines of direction. Having explained how a continuous vibratory motion of atoms was obtained under his theory, he gave an opinion as to the change in those vibrations, which, he thought, brought about heat, light, or sound; and he considered that light was made manifest to the senses by a change made by the eye in the perturbations of force or vibration of atoms, whereby a motion is communicated to the nerves.

These views are criticised and opposed in a brief discussion. One member regarded the opinions advanced by Mr. Warner as being liable to the well known summary once made by a critic that what in them was true was not new, and what was new was not true. That the question whether motion should be resolved into heat in case of the impact of moving bodies had nothing to do with time; it was equally true of the slow heating of a railway axle and the instantaneous flash when a projectile struck an iron target. The question was, did the impact destroy cohesion in one of the striking bodies? If so, motion became heat.

Ancient Dentistry.

Dr. Reid, of Terre Haute, read a paper upon ancient dentistry. Among the ancients great success was obtained in this art. Casselius was a dentist in the reign of the Roman triumvirs, and gold was used for the filling. But nearly 500 B.C., gold was thus used, and gold wire was employed to hold artificial teeth in position, and it does not seem then to have been a new art. A fragment of the tenth of the Roman tables, 450 B.C., has reference to preventing the burial of any gold with the dead except that bound around the teeth. Herodotus declares that the Egyptians had a knowledge of the diseases of teeth and their treatment 2,000 B.C. In Martial, Casselius is mentioned as either filling or extracting teeth; but he specified that he would not polish false teeth with tooth powder. Lucian mentions an old maid that had but four teeth, and they were fastened in with gold. These facts cover a period of 600 years.

Intermarriage of Blood Relations.

Prof. Richard Owen, LL.D., A.M., of the Indiana State University, stated an important fact which cannot be too widely disseminated, namely: That the intermarriage of blood relations is a physiological error, and he might almost say, with our knowledge of such matters, a crime. Speaking from a close observation of this subject for many years of all the families of his acquaintance where close intermarriage had been permitted, the children were either deaf mutes or were afflicted by some deficiency. He knew a young man whose father was a physician, and who should have known better than to marry a double cousin, but the consequence was, as the last portion of the osseous system developed, the young man, from the intermarriage of those in whom the same material was deficient, was prevented from having a single tooth at any period. His sister had but two or three small stubs of teeth, and their brother was altogether deficient in his mental faculty. He insisted that it was a great crime for parents to allow their children to grow up with the idea that they might ever intermarry with blood relations. It should be a thing never to be thought of, the intermarriage with those connected by ties of consanguinity.

Mr. Ferguson knew of a case in Ohio where some thirty families had married and intermarried until they could no longer tell their relationship. Most of the progeny were deaf mute, and the remainder a little above idiotic.

The Mental Capacity of Races.

A paper was read. by the President, from Mr. Renas Davis, of Bennington, N. H., on the causes of the "Difference in Mental Capacity of Races." The hypothesis is this: 1. The principle that we call mind in contradistinction from matter is simply a force or power like electricity, etc. 2. This force or power is precisely the same, whether it runs the machinery of a fish, bird, monkey, or man. 3. The different mental phenomena of organized animal life are in the material or machine, and not in the power or force that operates it. 4. The difference in mental capacity between a high or low race of men, or between men and other animals, or between other animals, is simply in the quality of the material of which they are composed, and in the simplicity or complexity of organization which the material assumes. 3. The basis of the material of which animals are composed is plants. 6. As to the two million or more varieties of plants that grow on the earth, the rule holds that the greater the number of these plants represented in the animal, the greater his mental capacity; but as there is a great difference in the value of plant material, ten of some kinds might be worth more than 100 of others, and this modifies the rule.

It was pointed out that the motive power or force could not be considered as an intelligent identity, from the fact that it is very feeble in the commencement of life in each individual throughout the animal scale, and when the material part becomes diseased or enfeebled, the mental capacity usually declines; if the mental force were an intelligent identity, there is no apparent reason why a child one day old or a decrepid old man should be wanting in the intellect of maturity. That the intellectual force is the same in kind in men as in other animals is obvious from many reasons which were alleged. A contrary supposition would involve as many different forces as there are species of animals, and a system as complex as the Ptolemaic cycles and epicycles.

In regard to his theory of variety of plant food, Mr. Davis thought that in the geologic eras variety was unattainable and hence the forms of life were of a lower order. He exemplified the progress of various races *pari passu* with the increased variety of their food, a variety of animal food being equivalent to a variety of vegetable material to whatever extent the animals used for food were fed on a variety of plants. He believed that from ninety five to ninety-seven per cent of mental power was inherited, and that it was hence only on three to five per cent of mental force that changes were effected in the individual; hence the many generations required for improvement. He believed that civilization kept to the line of the grasses upon the earth's surface, and that its development was largely aided by beef and mutton; but it might have begun in a fruit bearing locality—a Garden of Eden; it would come to a standstill in a forest, in a desert, or a South Sea island.

Tremolo for Reed Organs.

This invention consists in the use of a rotary prism applied to organs or melodeons in such way that the sound waves can strike it at different angles, to be reflected in different directions, and thus produces the desired tremulous effect. If preferred, however, a quadrangular or rhombic prism may be used. It is made of thin wood or other light material, preferably hollow, so that it can be revolved with little power. Its ends have projecting pins which are hung in a stationary frame. One of the pins is provided with a crank or cam, whereby it is connected with the shaft of the wind wheel, which, when revolved, will impart rotary motion to the prism. The wind wheel is arranged and moved in the ordinary or other suitable manner. When the sound waves strike the revolving prism at different angles, they are reflected with greater or less force, according to the differences of angles, on the same principle as waves of light are reflected, and thus produce the desired tremulous effect. The prism is to be placed in a position where the sound waves can strike it directly after they leave the reeds. John R. Loma , of New Haven, Conn., assigner to B. Shoninger, of the same place, is the inventor of this improvement.

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TORNADOES AND WATER SPOUTS.

Professor Whitfield gives in the *American Journal of Science* the following statements relative to tornadoes and water spouts:

One of the most remarkable accompaniments of the tornado is the black column or spout, extending from the cloud down to the surface. It precisely resembles a column of black smoke, such as pours from the pipes of a steamer burning pine wood; it is, in fact, condensed vapor or cloud, intensified in blackness by the dust and rubbish carried up from the ground.

The tornado is a shell or hollow cylinder of air, and all its energy lies in its rotating rim, which is powerfully compressed by two antagonistic forces, centrifugal and centrepetal. The rapid whirl draws the air from the center towards the circumference, where it is met and opposed by the inrushing winds. There is, consequently, a rarefaction, a great reduction of temperature by expansion, and condensation of vapor within the shell.

The spout does not hug the earth continuously, but rebounds or *ricochets* along the uneven surface, often skipping the valleys, but generally desolating the hills. It is disposed, however, at every recurrence to strike at the same points. It is not an established fact, but it is commonly believed, and with some reason, that the tornado does, in the course of years, return along its beaten path, and that it is unsafe to build where one has ever passed. A house in Pickens county stood on a hill from which a log cabin had been blown away some thirty years before. I witnessed the last of three which have passed along the same track. Near Hernando, Miss., three have followed an unvarying line. It is probable that there are some localities more favorable than others to the generation of these storms, and if this be true, then the law of direction, hereafter explained, accounts for their progress along the indicated path.

Such an opportunity, as fell to my lot, of witnessing the formation and course of a tornado is rarely enjoyed, and the phenomena observed on that occasion are of great value in illustrating the origin of these whirlwinds. On the 29th of April 1867, at ten o'clock, A.M., I was approaching Tuscaloosa, on the Elyton road, the general direction being east and west. The weather was hot and oppressive, while a perfect calm prevailed both at the surface and in the upper regions, for the leaves were not stirred upon the trees, and the heavens were covered with fragmentary clouds, perfectly at rest. Occasional large drops of rain fell, and there was, now and then, lightning. The atmosphere was evidently surcharged with vapor, and in a condition of great electrical excitement. At the distance of three and a half miles from town, an elevated ridge, over which the road passed, afforded an extended view, and I saw a mass of black cloud detached and hanging over the western horizon. It appeared nearly circular in shape, with the exception of a slight angular projection, like an inverted cone, at its lower edge. I afterwards ascertained that it was at this time about five miles distant from me, and a calculation, based upon the estimated angles, fixed the elevation of its base above the surface at about fifteen hundred yards, and its diameter, considering it a sphere, at about six hundred. It was entirely at rest.

The first view of this cloud suggested to me the possibility of a tornado, and I watched it closely as I drove along in my buggy. While I was driving, leisurely, more than a quarter of a mile, it maintained its position and outline unchanged. At length a farm house with its shade trees intercepted the view for about a minute, and when I came again in sight of it, the projection beneath the ground appeared in violent commotion. There was now no longer any doubt of the character of the phenomenon about to be exhibited, and satisfied, from a knowledge of the general direction of tornadoes, that it must come near me, I leaped from the buggy and released the horse as quickly as possible, in order to give him a chance for his life. This did not occupy more than half a minute, and when I turned to look again, the black column was formed, reaching from the cloud to the ground. A few moments showed that it was rapidly approaching. I remember noticing small fragments of cloud moving toward it from the north, but there was no perceptible breeze where I stood. When about a mile distant I saw that it would go south of me, and at this time I first observed the surface drift, which appeared like an innumerable flock of birds, flying around the summit of the column, and here, too, the pine tree spoken of emerged from the vortex, and settled slowly to the earth. The column was now much shorter than when first formed; the cloud had descended much nearer the surface. It passed about three hundred yards south of my position, and at this point the first electric discharge took place. The lightning zigzagged down the column, shedding through it a lurid glare. The roar was deep toned and powerful. The gyratory motion was distinctly visible. When a little further on, it became so enveloped in clouds as to be no longer distinguishable, but I knew, by the now frequent peals of thunder, that it was increasing in violence and levelling all things in its path.

This tornado was formed about a mile and a half southwest of Tuscaloosa, over an extensive marshy flat, where an observer characterized it as a "big whirlwind." It was not destructive at first, but grew in energy as it progressed, and two miles from its starting point threw down a dilapidated building. About six miles from Tuscaloosa it struck a log cabin in which were sitting a woman and several children. Every log above the floor was carried away, while the occupants were left uninjured. Twelve miles further on it performed a similar feat, taking off every log of a house without the slightest hurt to any of the family, all of them having taken refuge within on its approach. This is remarkable, but there are other like instances well authenticated, and it is commonly believed that a log house is the safest retreat. The direction of this tornado was east by 20° north. After its passage the air was cool and pleasant, and at four o'clock in the afternoon heavy rain came from the north, followed, for the next few days, by clear weather with northwest winds..

The most remarkable fact disclosed by the phenomena of this storm is the inherent power of progression which it unquestionably possessed. After the gyration was established it began at once to travel eastward, not driven by any wind, but plowing its own way through the tranquil atmosphere with tremendous speed. Here is presented a problem, which, so far as I know, has not heretofore been propounded. Its solution is important to the science of meteorology. The fact that tornadoes invariably move from the southwest to the northeast is well established, as also the fact that, by an impulse acquired from the earth's rotation on its axis, they gyrate from north to west by south. This backward gyration is thus explained: all parallels of latitude decrease in diameter, and therefore in circumference, as we go toward the poles of the earth. As they all revolve in twenty-four hours, it follows that every one, approaching the pole on either side of the equator, moves around more slowly than the one preceding it. Therefore, a current moving southward, to the vortex of a tornado in the northern hemisphere, finds that vortex rotating eastward with a superior velocity, and is left behind, or projected to the west; while for the same reason, a current blowing northward to the vortex, finds it rotating with inferior velocity, and, preserving its own easterly momentum, is hurled forward or projected to the east. Thus the south half of the rim being impelled eastward, and the north half westward, the backward or left handed gyration is fixed and maintained. Just the reverse is true in the southern hemisphere of the earth, while on the equator the gyration would be free to take either direction.

Curious Meteorological Facts.

In the fourth meteorological Report by Professor J. P. Espy, of Washington, D. C., we find the following instructive generalizations:

1. The rain and snow storms, and even the moderate rains and snows, travel from the west toward the east in the United States, during the months of November, December, January, February, and March, which are the only months to which these generalizations apply.

2. The storms are accompanied with a depression of the barometer near the central line of the storm, and a rise of the barometer in the front and rear.

3. This central line of minimum pressure is generally of great length from north to south, and moves side foremost toward the east.

4. This line is sometimes nearly straight, but generally curved, and most frequently with its convex side toward the east.

5. The velocity of this line is such that it travels from the Mississippi to the Connecticut river in twenty-four hours, and from the Connecticut to St. John, Newfoundland, in nearly the same, or about thirty-six miles an hour.

6. When the barometer falls suddenly in the western part of New England, it rises at the same time in the valley of the Mississippi, and also at St. John, Newfoundland.

7. In great storms the wind for several hundred miles on both sides of the line of minimum pressure blows toward that line directly or obliquely.

8. The force of the wind is in proportion to the suddenness and greatness of the depression of the barometer.

9. In all great and sudden depressions of the barometer there is much rain or snow; and in all sudden great rains or snows there is a great depression of the barometer near the center of the storm, and rise beyond its borders.

10. Many storms are of great and unknown length from north to south, reaching beyond our observers on the Gulf of Mexico and on the northern lakes, while their east and west diameter is comparatively small. The storms therefore move side foremost.

11. Most storms commence in the "far west" beyond our most western observers, but some commence in the United States.

12. When a storm commences in the United States, the line of minimum pressure does not come from the "far west," but commences with the storm, and travels with it toward the eastward.

13. There is generally a lull of wind at the line of minimum pressure, and sometimes a calm.

14. When this line of minimum pressure passes an observer toward the east, the wind generally soon changes to the west, and the barometer begins to rise.

15. There is generally but little wind near the line of maximum pressure, and on each side of that line the winds are irregular, but tend outward from that line.

16. The fluctuations of the barometer are generally greater in the northern than in the southern parts of the United States.

17. The fluctuations of the barometer are generally greater in the eastern than in the western part of the United States.

18. In the northern parts of the United States, the wind, generally in great storms, sets in from the north of east and terminates from the north of west.

19. In the southern parts of the United States, the wind generally sets in from the south of east and terminates from the south of west.

20. During the passage of storms the wind generally changes from the eastward to the westward by the south, especially in the southern parts of the United States.

21. The northern part of the storm generally travels more rapidly toward the east than the southern part.

22. During the high barometer on the day preceding the storm it is generally clear and mild in temperature, especially if very cold weather preceded.

23. The temperature generally falls suddenly on the passage of the center of great storms, so that sometimes, when a storm is in the middle of the United States, the lowest temperature of the month will be in the west on the same day that the highest temperature is in the east.

Some of the storms, it is true, are contained entirely, for a time, within the bounds of my observers, and in that case the minimum barometer does not exhibit itself in a line of great length, extending from north to south, but it is confined to a region near the center of the storm, and travels with that center toward the eastward.

From these experiments it may safely be inferred, contrary to the general belief of scientific men, that vapor permeates the air from a high to a low dew point with extreme slowness, if, indeed, it permeates it at all; and in meteorology, it will hereafter be known that vapor rises into the regions where clouds are formed only by being carried up by ascending currents of air containing it.

The Coke Trade.

The western portion of Pennsylvania, says the *Protectionist*, is becoming quite celebrated for its extensive coke trade. The Pittsburg and Connellsville Railroad Company derives an enormous tunnage from the manufacture of coke, and every month it is increased by the addition of new ovens. Indeed the trade has assumed such vast proportions that the Pennsylvania Railroad Company is taking the preliminary steps to secure a portion of this important traffic. Surveys are making for a branch road from Greensburg to Connellsville—less than twenty-five miles—which, when completed, will be a paying institution from the commencement of business, for the reason that it will extend every facility to the coke men for their freights, and for the additional reason that the distance to Pittsburgh will be shorter than by the Pittsburgh and Connellsville road.

There are upwards of 900 coke ovens along the Pittsburgh and Connellsville road, and the Uniontown Branch and Bradford and Mount Pleasant Branch roads, and nearly 400 additional ones are being constructed. Some idea of the tunnage can be formed when it is known that the production largely exceeds 100,000 bushels, or about 5,000 tuns of coke per day, and falls far short of the demand.

The extension of the Hempfield railroad, east from Washington, Pa., to connect with the Pittsburgh and Connellsville railroad, is partially with a view to secure a portion of this tunnage. When built, the distance to Wheeling will be reduced some forty miles from Baltimore, and place that city within thirteen miles of the same distance from Baltimore that Pittsburgh is.

The enormous piles of "slack" or waste coal lying contiguous to the Westmoreland Coal Company's mines is to be utilized at last and turned into coke. The Messrs. Carregie, of Pittsburgh, and others, are constructing coke ovens along the Pennsylvania railroad for this purpose, and it is said they will be successful, having a process for desulphurizing the fine coal. The sulphur has heretofore prevented coke being made from the Westmoreland coal.

Lightning versus Gas Pipes.

Last summer the steeple of the Congregational church at Terre Haute, Ind., was struck by a bolt. From the description of it as given by an intelligent citizen of that place, the following facts are gathered: The bolt hurled the lightning rod into the street, then extending its force down and over the brick wall of the church, it seized upon the gas pipe in the wall, hurling the bricks outside at the point and the plastering inside; then passing down this pipe to the meter, it collapsed it and its lead connection pipes, and crumbled its dial plates; then it punched a hole an inch in diameter into the iron pipe that connects with the street main; passing along this connection to the street it ran along an iron main, of an inch bore, 650 feet, and along an iron main of four inches bore 350 feet, bursting the hubs of these mains along a distance of 1,600 feet before its projectile energy was dissipated.

The lead packing of these pipes partially insulated the iron at each joint, in consequence of the lead being a poorer conductor than iron by two and a half times, obstructing the moving force of the bolt, forcing the hubs of the pipes asunder for the distance above mentioned, causing a leakage of the gas and the discovery of the facts here detailed. Here, then, we find approximately the correlative amount of metal necessary to dissipate the energy of an ordinary bolt. Taking the outside of the pipes, we shall have about 1,400 square feet of metal surface; include the inside, and we have 2,800 feet, and this would be equivalent to about 300 ordinary lightning rods.

Now if it took 1,000 feet of six and four inch bore of iron pipe laid in the moist earth to dissipate a thunderbolt, and only dissipated it after an extraordinary amount of energy was neutralized in the breaking of the iron hubs, how much of a similar bolt would be dissipated by five or six feet of a lightning rod of three quarters of an inch in diameter, projecting into the ground, which is the case with most rods? I will leave electricians to answer the question.—*From a paper read to the Franklin Institute, by Professor J. Wise.*

IF we would establish the habit of drinking water freely in the morning, soon after arising, commencing with small quantities, increasing gradually as we learn to relish it, until the chief portion taken during the day is before breakfast, it will promote the health to a much greater extent than it ordinarily does, eradicate disease from the system, and become a most decided luxury in time.

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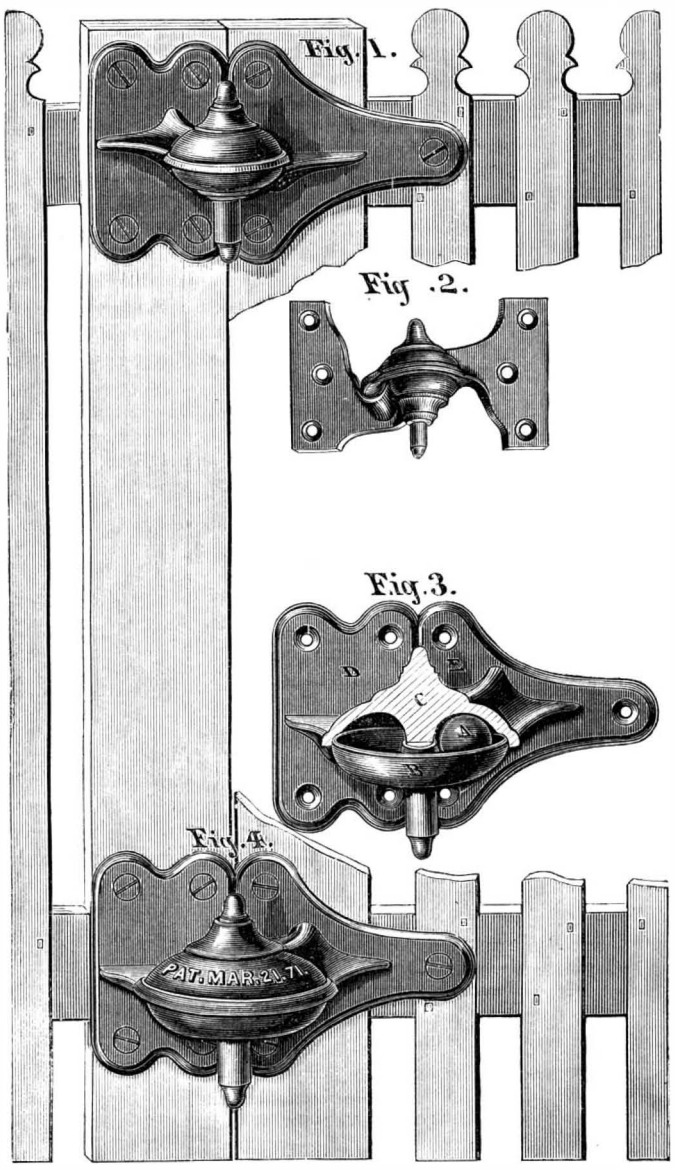
LEMMAN'S ANTI-FRICTION BALL GATE HINGE.

Perhaps there has been no greater source of petty annoyance to farmers than the sagging of gates and the loosening of their hinges. To remedy these evils, resulting in a great measure from excessive friction in the action of the hinge, and also to furnish a cheap and durable substitute for the hinges hitherto employed are the objects sought in the invention of M. R. Lemman, patented March 21, 1871, and illusted herewith.

Figure 1 represents the upper hinge attached to the post and gate. Fig. 4 shows the lower hinge, in which the ball is placed which carries the weight of the gate, causing the latter to be opened very easily without friction. Fig. 3 shows a sectional view, a portion being broken away to show the groove and ball in place. Fig. 2 represents a shutter hinge of smaller size, and modified somewhat in form to adapt it to the purpose, but acting on the same principle.



The ball carries the weight of the gate around the pintle in an annular groove, forming a complete circle. The top part of the hinge, that goes on the gate below, has a groove, corresponding with its mate on the post that rests on the ball. When the gate is opened, the ball making its circle, takes all the friction from the hinge, saving the wear and breakage. The top part of the hinge protects the working parts from snow and ice completely, making a handsome ornamental hinge. On small gates the upper hinge is made smaller than the lower one, and the pintle being placed closer to the post, makes such gates self-closing.

For further information address the manufacturers, Lemman & Owens, Hamilton. Ohio.

Glueing.

Sherrard B. Barnaby, in the *Quarterly Journal of the Amateur Mechanical Society*, says:

The right sort of glue to use for ordinary work is "best Scotch" (inferior kinds are often adulterated with lime). This glue is sold at all good tool shops; but if it cannot be obtained choose the most transparent cakes. For fine work in light colored woods, Salisbury glue may be used; this is made in thin cakes, and is of a clear amber coler.

PREPARATION OF THE GLUE.—Break it into small pieces with the hammer, and soak for at least twelve hours in sufficient water to keep it covered even when swollen by the water it absorbs; this water must be cold. It is no use attempting to melt glue by putting it into hot water; it will always be stringy, and give endless trouble. Put the pieces of soaked glue without any superfluous water into the glue pot, taking care that the outer vessel is kept full of water, which will prevent the glue in the inner vessel from burning; this is very important.

The glue will soon dissolve; it will be thin at first, but quite strong enough; subsequent boilings will, however, improve it, so long as it is never allowed to burn; indeed, as water is driven off by evaporation, more will have to be added. If stronger glue is required, it may be made with beer instead of water, and stronger still if linseed oil is added to it instead of water, as the original water in which it was dissolved is evaporated by boiling.

Cleanliness is very essential to the well being of glue; a wooden cover should therefore be provided for the pot, and if any dust or dirt is on the cold glue, it should be just washed off before putting the pot on the fire. A scum always rises as the glue boils; carpenters generally stir this in with the brush, I prefer to skim it off, and put it in a gallipot, where it accumulates and settles with waste scrapings, and much of it may be utilized afterwards.

A wire stretched across the pot is very useful to remove superfluous glue from the brushes; this is much better than pressing them against the edge of the pot, where quite enough glue is sure to accumulate and burn.

Never use any of that old dried up and burnt glue which may be generally found in the bottom of a glue pot kept in a kitchen; have the whole concern boiled out in a saucepan before you put your nice clean glue into the pot.

HGW TO USE THE GLUE.—It must not be supposed that the strength of a glue joint depends upon the quantity used; those joints hold the best in which the pieces of wood are brought closest together. The following is a brief description of the process to be pursued:—Have the glue as hot as possible, the glue pot within easy reach, a basin of hot water, and a bit of sponge on the bench. Cover quickly with hot glue both the surfaces to be united, and rub them together, pressing out all the glue that can be got rid of; let the motion of the one piece on the other be but slight; for instance, in a three foot joint the top piece need never move more than an inch or two beyond the other, which is fixed, it is supposed, in the bench screw; it will be soon felt that they are inclined to stick together, then they must be brought at once to that which is to be their final position, and not moved again. Superfluous glue may now be wiped off with the sponge when necessary, *i. e.*, when it is in an angle or an awkward place to get at afterwards; but as a general rule, and particularly in a long joint, it should be left on till cold, for it excludes the air, and goes a long way towards making a good permanent joint.

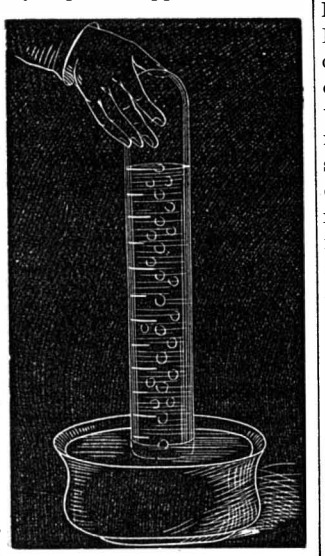
If the edges of two long boards have to be glued together, the job will require two hands. One board having been fixed in the bench screw, the other is rested against it, so that the edges meet obliquely, making a very blunt V. While one workman steadies this second board (with the help of a weight, or the jack planes on the bench to keep it from slipping), the other, holding the glue pot in his left hand, passes the brush, well loaded with glue, rapidly along the edges; he must not mind wasting his glue; there is no time now to be careful about spilling a drop or two. When the edges are quite covered, he takes one end of the loose board, his assistant the other, and they rub it up and down a time or two till it sticks, as with shorter pieces.

And here note that if you are not skillful enough to shoot a perfectly true edge on your board, make it slightly concave rather than convex; for the ends have a tendency to rise.

In glueing flat pieces of wood together, such as two or three thin pieces to make one thick, with the grain running two or three different ways, screw clamps are required. These are wonderfully useful things, for many purposes, very cheap, and not half enough used by amateurs.

NEW TEST FOR KEROSENE OILS.

At the recent meeting of the American Association, Professor Vander Weyde explained a new and excellent test for the safety of hydrocarbon oils. He takes a glass tube, closed at one end and open at the other, and fills it with the petroleum to be tested; then closing the open end with the finger, inverts it in a vessel with water, warmed to 110° by mixing hot and cold water, and keeping it at that temperature by occasionally adding hot water. If now any vapor be apparent, it will collect in the closed upper part of the tube, displacing the oil downward. The amount of this gas will be a comparative test of the different qualities of oil, and for this purpose the tube may be graduated in order to measure the amount of volatile liquid present in the same.



This method is not subject to the discrepancies found in the usual way of testing, in which an impure and dangerous quality of oil may be made to appear better than it is by slow and gradual heating; and which, if performed in a slight draft of air, will have the vapors carried off as soon as developed, so that it becomes impossible to ignite them. This new method gives freedom from the danger of using fire, more accuracy, a trustworthy means of measurement, and no chance for deception.

This test for petroleum is founded on the fact that all vapors given off by petroleum are combustible, and that if any kerosene, or other preparation from petroleum, gives off a vapor at the accepted standard temperature of 110°, it is not necessary to try whether it will burn, but sufficient to collect it in a proper vessel, by which we gain the additional advantage that we may measure the quantity of the vapor, while none of it can be lost by air currents incidentally passing over the surface of the liquid.

MASSEY'S DOUBLE COLUMN HIGH PRESSURE AND LOW WATER ALARM FOR STEAM BOILERS.

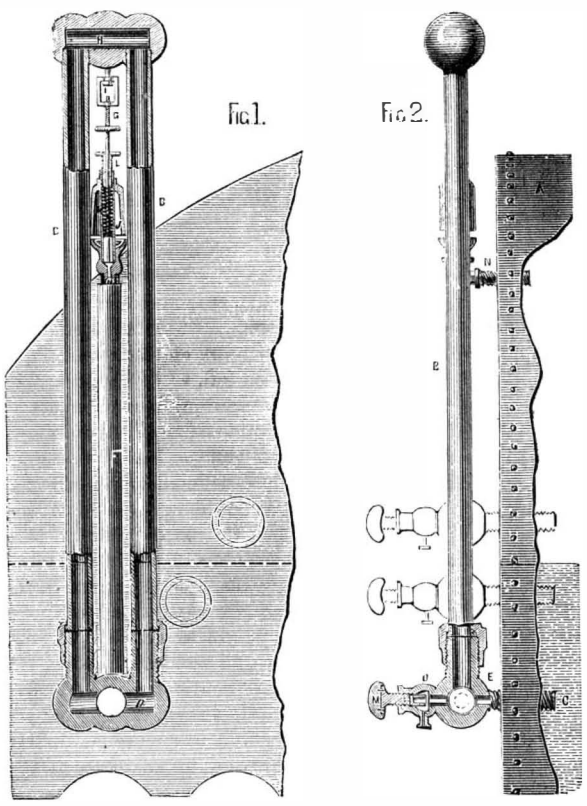
In a recent article on the *Westfield* explosion we took occasion to say that all boilers ought to be provided with both high pressure and low water alarms.

The engraving published herewith exhibits the construction of an instrument intended to perform the functions of the two instruments named, and it is claimed that it acts with unerring certainty, that it does not clog either by scums or sediment, that it is simple, easy of adjustment, and in every way free from defects that would tend to render it inoperative through the action of corrosion or any result of exposure in actual use.

We have been shown numerous certificates from proprietors and superintendents of extensive establishments, speaking in the highest terms of the superior qualities of this attachment, and vouching for its reliability under all circumstances.

Fig. 1 is a front view of the instrument as applied to a horizontal boiler, and Fig. 2 a side view, showing the gage cock and steam connections; B is a double tube: E a chamber or iron tube forming a steam and water connection with the boiler; N a steam connection with the whistle; J a hollow spindle through the whistle; K a spiral spring to hold the valve in its seat; L a screw for adjusting the steam whistle to any desired pressure; G the valve rod, and I the swivel for adjusting for low water.

When the water in the boiler and chamber is above the



lower gage cock, the communication with the detector is submerged, and both tubes filled with water, the temperature of which cannot exceed 212° Fahr.; at this temperature the detector is adjusted. When the water in the boiler descends below the lower gage cock, steam will enter one of the tubes, B, and almost instantly expel the water from the detector through the opposite tube, into the boiler, filling the space with steam, the increased heat of which will expand the tubes, raising the valve, and sounding the alarm. Over pressure of steam in the boiler may be indicated by adjusting the spring, K, to the desired pressure, by raising or lowering the screw, L. To adjust to high pressure, the safety valve is set to the desired maximum pressure, and steam raised until it blows off; the screw, L, is then raised or lowered at the top of the whistle, until steam escapes through the whistle at the moment the safety valve raises, or a few pounds higher if desired. It will be seen that when the pressure of steam exceeds the power of the spring as adjusted, the valve will be raised and the whistle sounded. To adjust for low water, the milled wheel attached to the valve rod, G, is held, and the swivel, I, turned until it rests firmly on the head of the screw at its upper end, when the least expansion or lengthening of the tubes will raise the valve of the whistle against the power of the spring and sound an alarm.

After adjusting the detector for low water, the jam nut in the swivel is tightened, so that the adjustment may not be altered except by design.

An alarm being sounded, an examination of the gage cock wfll determine whether it was occasioned by high pressure or low water.

This ingenious invention was patented through the Scientific American Patent Agency, by Gideon B. Massey, of New York, Aug. 23, 1870, and another patent will issue Sept. 5th, of the present year. For further particulars address Massey Low Water Detector Company, 56 Broadway, New York city

A FORMATION, in ledges, of Labrador spar has been discovered in New Hampshire. This mineral was not previously known to exist in New England, although it is not uncommon in the Adirondack mountains. Professor C. H. Hitchcock, of the New Hampshire Geological Survey, brought the fact to light.

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AN INCIDENT IN THE LIFE OF BARON LIEBIG.

BY PROFESSOR CHARLES A. JOY.

It was my good fortune, a few summers ago, to spend a week with Baron Liebig, at a quiet inn on the banks of Lake Geneva, in Switzerland, and to be his constant companion in his rambles through the vineyards and lovely walks of that enchanting spot; and one day, the conversation turning upon some of the incidents of his early life, I asked him to relate to me how he happened to devote his attention to chemistry, and to what circumstances he owed the kind interest bestowed upon him by Gay-Lussac.

The genial old man sat down upon a bench in a protected nook, and related to me the following incidents: He was the son of very poor parents, who could ill afford to keep him at school, and he had a narrow escape of being put at a trade; but, while yet a lad, having heard that the Minister of Instruction, in Darmstadt, had it in his power to aid meritorious children by a government stipend, he went to the palace, and after several failures, finally succeeded in obtaining an interview with this grand personage, and in securing sufficient assistance to enable him to go to the Gymnasium. The Director of the Gymnasium was in the habit of visiting the school on stated occasions, and of asking each boy what he purposed to make of himself, and of receiving the usual answers: "a musician," "a doctor," "a lawyer," etc.; and when he came to Liebig, the reply was always ready, "I mean to be a chemist, Sir;" to which the Director uniformly answered, "you stupid boy, there is no such profession as chemist." But Liebig persevered, and while at the University, was so fortunate as to make a very important discovery of some new cyanogen compounds, and with specimens of these preparations in his pockets, aided by some friends, he set out for Paris. He was then about twenty years of age. In Paris he sought out one of the members of the Institute, and showed him his specimens, and the Professor offered to exhibit them to the Institute, and to present the subject for discussion; but it was a long time before he fulfilled his promise, and poor Liebig went regularly to the Monday meetings of the Academy, hoping to hear his name mentioned, but always went away disappointed. One day, however, the subject was duly presented, and attracted great attention; and after the adjournment several members remained to talk to the boy, for he was still a boy, and to inquire into his history; among them was a kind man in the prime of life, who asked him to dine with him on the following Thursday to meet some of the chemists of Paris. The man who thus proposed to befriend the unknown chemist must have given his name and address, but Liebig was so embarrassed and flustered by the occasion that he forgot it entirely, and although he asked the janitor and several persons who were left in the room, he could obtain no clue, and so Thursday went and came, leaving Liebig in a state of desperation. A few days afterwards, meeting casually the member of the Institute who had presented his paper, the latter exclaimed at once, "Why did you not come to the dinner that Baron Von Humboldt gave for you on Thursday? He invited Arago, Gay-Lussac, Thénard, and several of the first chemists of the city, in order to interest them in you, and you did not come." Liebig did not wait to hear more, but rushed off to the residence of Von Humboldt, to apologize and to explain the occasion of his absence.

Von Humboldt took the matter good naturedly, and at once accompanied his young *protégé* to Gay-Lussac, who, to oblige his friend, took him as a pupil into his laboratory, and from this moment Liebig's career was secured.

The kind interest of Von Humboldt started him on the path which he has since pursued to the highest distinction; and when, a few years later, the famous book, "Agricultural Chemistry," was published, we find it dedicated to his great patron and friend, Alexander Von Humboldt. Liebig has not forgotten his obligations to the French, and we can understand with what eloquence of language and sincerity of emotion he uttered the following words at a recent meeting of the Royal Bavarian Academy of Sciences, in reference to the future relations of Germany and France:

"The Academy seizes this moment to declare openly that there exists no national hatred between the German and Latin races. The peculiar character of the Germans, their knowledge of languages, their acquaintance with foreign people, the past and present state of their civilization, all tend to make them just toward other peoples, even at the risk of often becoming unjust toward their own; and thus it is that we recognize how much we owe to the great philosophers, mathematicians, and naturalists of France, who have been in so many departments our masters and our models. I went forty-eight years ago to Paris to study chemistry; a fortuitous circumstance drew upon me the attention of Alexander Von Humboldt, and a single word of recommendation from him caused M. Gay-Lussac, one of the greatest chemists and physicists of his time, to make to me, a young man of twenty, the proposal to continue and finish, with his co-operation, an analysis which I had commenced; he introduced me as a pupil into his laboratory; my career was fixed after this. Never shall I forget the kindness with which Arago and Thénard received the German student; and how many compatriots, physicians, and others, could I not name, who, like myself, gratefully remember the efficacious assistance afforded to them by French men of science, in finishing their studies! An ardent sympathy for all that is noble and grand, as well as a disinterested hospitality, forms some of the most noble traits of the French character."

THE odor of the herb pennyroyal is shunned by fleas, and a few of the leaves will drive them away from any room or person. Other plants of the mint species are said to have the same useful characteristic.

Coal Holster and Conveyer.

Mr. Joseph Green, of New York City, assignor to himself and George Stancliff, also of New York, has recently patented an apparatus for hoisting and conveying coal in gas works, goods or shipping docks, etc., which is an ingenious piece of mechanism. We can at this time give only the outline of this invention, so that our readers may gain some idea of its working.

The bucket is self locking, and when filled is hoisted up to a truck running upon a slightly inclined railway. As soon as the bucket reaches the truck, it is automatically locked thereto, and, by the continual winding up of the rope, the truck and bucket are drawn along the track till they reach a pin placed in the side of the track, over the place where it is designed to drop the coal or other material. This pin trips a lever which unlocks the bucket, and allows it to discharge. The motion of the hoisting drum being then reversed, the truck carrying the bucket rolls back along the slightly inclined railway by virtue of their gravity; and when they reach the point at which the bucket must be lowered, the bucket is automatically unlocked from the truck and falls, to be again refilled, and so on. The apparatus works with great smoothness and uniformity, and is undoubtedly a valuable improvement.

PLUCKY SUSAN, OR LUCK AT LAST.---A LEAF FROM THE LIFE OF A WESTERN INVENTOR.

[From the Janesville (Wis.) Gazette.]

You think I'm nervous stranger? Well I am
If 'twa'n't for making silly people talk
I'd get right off this pokish train and walk
From here to where I'm going—Amsterdam.

That's where I live, you see. As for Lacrosse—
(Excuse me, neighbor, I must talk or bust)—
Since I've been there it's three years certain, just:
And now to laugh or cry is just a toss.

"Married?" Why, yes, that's where it is, you see;
I've telegraphed her I was strong and well,
And coming to her; but I didn't tell
That I was rich. I thought I'd let that be.

It's too good luck, this is, to last, you know
And, stranger, if I wasn't kind of rash,
I'd bet my bottom dollar that we smash
Before—but, shaw excuse me, I'll go slow

You see, when we were married, Sue and I,
I was a good mechanic, and not poor
Until I struck it, as I reckoned, sure,
In an invention I was working sly.

All I could make went into that concern;
And people called me crazy for it, too,
And said I'd better stick to what I knew;
But folks *will* talk, and have to live and learn.

In all this world I had but one friend then,
But she stood by me nobly, through and through,
And said 'twould come out right at last, she knew—
One woman stanch is worth a dozen men.

Twas tough sometimes, though, when a loaf of bread
Stood on the table—all the meal we had—
I should have gone, alone, quite to the bad;
But, through it all, my Susan kept her head.

'Twas her advice that sent me off at last—
She said she'd work her fingers to the bone
And live for twenty mortal years alone,
Rather than give it up—thank God, that's past

A hundred thousand and a royalty
Is what I've got for going far away;
She cheered me by her letters every day;
A million could not pay such loyalty!

She knows I'm coming; but she doesn't know
That I am rich; and she will be there, too,
Dressed in her best—her best, my poor, dear Sue
I'll bet a hundred 'twill be calico!

"*I'll* dress her now?" You bet it!—but go slow,
This luck's a heap too good to last, I fear;
I shan't believe it till I'm fairly there;
The train may smash up, easy, yet, you know.

The only reason, if it don't, will be
That I'm so strongly thinking that it will.
I'm nervous, say you? Just a little, still
The luck is none too good for Sue, you see.

Hello! we're here!—there's Sue, by all that's grand
Stranger, excuse me, sir, but would you mind
To go ahead and tell her I'm behind?
I'm choking: see my eyes—you understand.

A New Steam Boiler.

This improvement is based upon the idea that uninterrupted circulation of the whole body of water in a boiler is a barrier to obtaining the best results in producing steam in such boiler. The introduction of diaphragms or partitions or their equivalents, which shall form separate water compartments in steam boilers, such compartments being so arranged that the heated gases and products of combustion, in their course from the fire box through tubes or in contact with surfaces to the "up take," shall come in contact with surfaces of a gradually decreasing temperature, the variations in temperature of such surfaces being caused by the division of the body of water within the boiler by means of the diaphragms or partitions or their equivalents, constitutes the general character of the invention.

The inventor states in this specification that, in adopting this principle, he is aware that he is running in direct opposition to the generally received theory, as the effort has heretofore been to produce just what he endeavors to prevent, a general circulation of the whole body of water from which the steam is generated. In locomotive boilers he employs three series of tubes, through which the heated gases pass in their course to the up take, by diaphragms or partitions. These series of tubes are separated. The diaphragms obstruct, if they do not entirely prevent, the circulation of the water, and the products of combustion will, in their course to the smoke box, pass over surfaces or through tubes of gradually diminishing temperature. The sediment naturally settles in a lower compartment from whence it may be readily removed by having a large man hole or two hand holes in the bottom of the shell. The water which fills the water legs of the boiler will consequently be nearly or quite pure. A flue, connected with the fire box, is made to divert a portion of the heat before it enters the flues of the water space, and conduct, it through the steam drum. By this means the steam is thoroughly dried and superheated before it is taken out of the drum for use.

A valve regulates the quantity of heat which enters the superheating flue. This valve is operated by the expansion and contraction of a rod (or upon the Thermostadt principle,) in the steam drum. A valve connected with this rod also regulates the draft, through the upper series of flues.

The heated gases and products of combustion which are allowed to pass through the steam drum are returned, and made to pass through the second series of fire tubes. A valve damper, by the opening of which a direct draft from the fire box to the stack is obtained, is also used. In starting fire in the fire box this arrangement is of much importance. Orifices through the diaphragms allow the feed water to pass upward from the lower to the upper series of tubes, and return chambers are placed intermediate between the sieres of tubes.

The inventor of this steam generator, Mr. Nathaniel M. Blanchard, of Spuyten Duyvil, New York, has thus boldly struck out a new path. The reasons which have led him to reject the principle of general circulation are not given in his specification, although in that connection they would certainly have been interesting.

A Patent Schemer Foiled.

A few days ago, says the *Washington Patriot*, Marcus P. Norton, of Troy, presented to Mr. Wilson, the clerk having charge of the records of patent assignments in the Patent Office, what purported to be a release of certain rights, held by F. J. Ransford and Peter Low, in an application for a patent for a "post office post marking stamp," which was rejected in 1859, and which Norton has recently been endeavoring to get permission from the office to renew.

This document was dated July 20, 1859, twelve years ago, but bore undoubtable evidence of being of much more recent origin. The paper was fresh, clear, and bright, and the folds were not even settled, but, as released from pressure, sprung open, like newly-folded paper. In addition to this, the writing of the body of the document, the signatures of the parties and the witnesses were all in one hand, slightly disguised, but recognized at once as Norton's. It is is said that even the color of the ink was not set, but that it grew blacker after the paper was filed in the office.

Mr. Wilson, of course, did not record such a document, but laid it before the Commissioner, who at once called upon Mr. Norton for an explanation. He admitted that it was not the genuine assignment, but claimed it to be a copy, of which he failed to produce the original.

Commissioner Leggett still holds the paper, but has taken no steps in the matter beyond issuing the following order:

UNITED STATES PATENT OFFICE,
WASHINGTON, August 23, 1871.

Until further orders Marcus P. Norton will not be permitted to examine any papers, look into any files, or transact any business in the Patent Office, except by and through some respectable and accredited attorney.

M. D. LEGGETT, Commissioner.

Re-appearance of Les Mondes.

The whole scientific world will rejoice at the re-appearance in Paris of Abbé Moigno's weekly journal *Les Mondes*, after its discontinuance pending the siege and the troublous times that followed. The good Abbé opens the new number with an address "To my dear readers," in which he casts some reproaches upon the scientific men of France who have set such a bad example to the Communists: "One of our greatest sorrows, our most poignant shame, was that all of the acts, of which we have been the witnesses and the victims, have been committed in the name of science under the command of monsters who knew not the first elements of science, not even of letters. What an odious spectacle to see a young doctor of 1867 making requisitions, by force and threats, of all the sulphur, phosphorus, bisulphide of carbon, petroleum, and other inflammable material!" The Abbé says that he was never in better health, and will be able to enter upon his weekly avocation with renewed vigor and "with entire confidence in the generous support of his readers."

We trust that no further interruption will occur in the publication of this valuable journal.

School for Engineers.

The East River Ferry Company, of this city, has established a school for the improvement of the engineers of the company. The school has a session twice in each week, and after the regular lessons are finished, a short time is devoted to the discussion of any matter pertaining to the steam engine or to steamboats, which may be suggested by a member of the class. All candidates for the position of engineer are in future required to undergo a searching examination. Employés of the company who are anxious for promotion have the privilege of attending the school. The institution is under the management of Superintendent Spears.

WATERMELONS are very injurious for debilitated and nervous people, but good for persons of full habits and torpid livers.

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Correspondence.

The Editors are not responsible for the opinions expressed by their Correspondents.

The Westfield Explosion.---How they use Steam on the Mississippi.

To the Editor of the Scientific American:

Although somewhat late to communicate with you upon this subject, I wish to express my surprise that such a conclusion should have been arrived at by the coroner and his jury, as to have caused the President of the line and engineer of the boat to have been arrested as the parties responsible for the disaster.

The Government, in view of the ignorance, of steamboat engineers and the public generally, of the strength of boiler materials to withstand stationary and vibrating pressures, attempted to regulate matters by prescribing that hydrostatic tests and examinations be made by certain inspectors of more or less ability, and that the persons given charge of steamboat boilers be examined and licensed. In order to make assurance doubly sure, a system of compound levers, called a lock up safety valve, has of late years been required to be bolted to each boiler, as a sort of cast iron substitute for brains.

Now here is a boiler that is supposed to have passed the required test, and has cast iron brains furnished to it to prevent the pressure from exceeding the lawful amount, and the engineer duly licensed, and in spite of all this, it blows up and kills a good many people. Now, who is responsible? is what many wise men have been consulted for the purpose of ascertaining. Clearly, the Government, and no one else. The inspector takes all responsibility from the owners, and he, acting in accordance with the printed laws and instructions, shifts the responsibility to the makers of those instructions and laws, whose name is the same as that of the devils in the herd of swine, Legion—rather too many to shut up in the Tombs.

The whole system then is at fault; instead of requiring that all parts of boilers should be built to sustain six times their working pressure, or three times their tested pressure, they are usually tested up as high as they will bear for an instant, and the pressure instantly relieved; the working pressure is then certified to be two thirds the highest point reached by the index of the pressure gage. No wonder that boiler makers say that cold water tests are bad for boilers.

The evils of the present system were brought very clearly to my mind recently, when I had business in the West, requiring me to tempt Providence by traveling on a Mississippi river steamboat, The boat had four cylindric boilers forty inches diameter and twenty-six feet long, each having two flues fourteen inches diameter. The boilers had been tested at 188 pounds, and the limit of steam pressure was 125$\frac{1}{3}$ pounds. They were of one quarter inch iron, single riveted. Getting sight of the steam gage, I found it showing 160 pounds, but I was much pleased when the engineer informed me that it was twenty pounds out of the way, and the real pressure was only 140. One of those shapeless traps called a lock up safety valve was attached, which was so effectually locked up that no steam could issue from it. The other valve was raised by hand when required, which was rarely, as the blow through valve was mostly relied upon when the boat was stopped. I found upon inquiry that the inspector's rule for testing boilers paid no regard to the strength of the flue (although Fairbairn's experiments were published many years since), but were based entirely upon the diameter and thickness of the shell, with a strength (assumed) of 60,000 pounds per square inch in tension. At my first opportunity, I made the following figures: $60{,}000 \div 2 \div 2 \div 40 = 375$ = bursting pressure of fore and aft seam; and for the flue, applied the formula in Haswell's book $\frac{1\frac{1}{4}^2 \times 93{,}000}{26 \times 14} = 187$ pounds pressure required to collapse the flue. Here then were these flues, that had been tested up to and beyond their calculated strength, and perhaps flattened in the operation, so they were ready to go at almost any time when the engineer should neglect to open his blow through valves. Should this article cause people to speculate more upon practical probabilities regarding boiler explosions, and learn that all boilers have a limit of strength that should not be exceeded, we may hope to see steam vessels made safe. H.

St. Louis, Mo.

Telegraphic Instrument for Learners.

To the Editor of the Scientific American:

In your paper of July 29th, in "Answers to Correspondents," I promised H. L. C. (who wanted to know how to construct an electrical engine) and T. G. B. (who wished directions for constructing instruments for learning telegraphy) that I would send them specifications and drawings gratis.

This I was prepared to do, but in addition to their letters I have received a score or more from other persons from nearly every State in the Union, and from Canada. I cannot write and send drawings to each separately, and as there seems to be so much interest manifested, I know of no better plan than to ask you to publish, for the benefit of all, a few remarks which I hope will be satisfactory.

As only H. L. C. has written about the electrical engine, and as I have answered him explicitly and fully, I will confine myself to the means of learning telegraphy without a battery or electromagnet.

It will save much time and space to simply state that the instrument which I propose is a slight modification of the Morse "register." I presume every one can obtain a sight of one of them. The modification is simply the removal of the electromagnet, and the addition of a "button" to the outer end of the pen lever, whereby it (the pen lever) is converted into a "key," and all manipulations thereof will be shown on the ribbon of paper as it passes between the rollers. In some registers both the down and back strokes are regulated by double nuts on the post at the outer extremity of the pen lever, but as this arrangement would interfere with the working of the key, two posts (adjustable) should be used; one at the outer end, to receive the down stroke and regulate the depth of the impression in the paper, and the other near the inner end to receive the back stroke and regulate the amount of motion.

Your readers will understand that this arrangement does not contemplate the transmission of signals to any distance, but simply a register of the manipulations of the learner, who will be able to correct errors which he would not recognize were he learning by sound. Two persons sitting at such an instrument can transmit messages to each other without having the disagreeable task of keeping a battery in working order; and after considerable practice the letters will be as readily distinguished by sound as by sight. I maintain that by the use of paper in learning, the learner acquires more exactness in the length of dots, dashes, and spaces than he otherwise would, and that if all the operators now employed had thus learned, very few if any of the egregious blunders constantly occurring would be made. The tailor's dying advice was "Always tie a knot in the end of your thread," and my advice to learners of telegraphy is, always space your letters and words as accurately as a good printer does Practice your letters j and k until the former is different from nn and the latter different from nt or ta. Give the dashes their full length, and shorten the dots as much as you choose, but above all space between your letters and words.

In regard to the learner being able to make his own instrument, if he is ingenious, skillful, and has the tools and material at hand, he can do so; but I would think it best to apply to some manufacturing electrician who, by the above description, could make exactly the right thing and furnish a roll of paper with it for about $20.

To those who prefer making their own, I would point out some difficulties and necessities, to wit; the pen lever must be hung so that the pen will accurately fit into the groove of the roller, and have not the slightest lateral motion. The rollers must be held together by springs or weights just sufficiently to firmly hold and draw the paper. Such an arrangement will allow the passage of irregularities, or a "splice" in the paper. The posts must be adjustable, by a perpendicular screw and check nut in their tops. If these conditions be complied with, the train of gearing working smoothly, no one will have any difficulty after a little experience in the working of the machine. M. L. BAXTER.

Aurora, Ill.

Brick Burning.

To the Editor of the Scientific American:

The answer to queries of D. H. S., Jr., August 26th, page 138, depends largely upon the method employed by him, whether he adopts the old fashioned way of building fires underneath and burning from below upwards, or resorts to a modern improvement where the fires are built in a separate furnace entirely outside the kiln proper, and where the products of combustion are carried into the top of a close room, while exhaustion is effected from the bottom, burning from above downwards, thus avoiding "benches" altogether, and improving the uniform quality of his stock.

Another important new feature is the construction of kilns so as to enable one to utilize the surplus heat remaining in the glowing mass of a newly burned chamber, by conducting it into an adjoining compartment filled with green material, instead of wasting it, as is done by the old method.

In the old fashioned way of burning, benches, of course, are unavoidable, and experience shows that three benches give better results than two, and where the clay (mud) is charged with coal dust, four benches are preferable.

The old way of burning takes about four cords of good hard wood to twenty-five thousand, that is, when coal dust is mixed with the clay, and about double that quantity when the coal dust is not used. Pine or other soft wood will not go so far.

On the North river, where the great bulk of our common brick for the New York market is made, coal dust is used almost universally, and the average expense for fuel (wood) slightly exceeds one dollar per thousand.

In Philadelphia and elsewhere, where a better grade of bricks is made and coal dust not used, the cost of fuel varies from $1.40 to $2 per thousand.

Bricks can "be well burned with the soft and sulphurous bituminous coal of Iowa and Illinois," or with any other combustible material, provided you avail yourself of the improvements recently made in this field.

The exact amount of coal required per thousand will depend very much upon the nature of the clay used, its manipulation, and also upon the method adopted in burning, whether you burn from below upwards in an open kiln, or from above downwards in a close kiln, and whether you utilize properly your surplus heat. A. R. MORGAN.

103 Fulton street, New York.

Canal Navigation.

To the Editor of the Scientific American:

As the articles in your paper, as far as they have come under my observation, in reference to canal propulsion, are based apparently on theory only, I can no longer forbear attempting to say something. The idea of producing an invention to propel more advantageously our present form of canal boats than by horses, is theoretical in the extreme, simply because the boats are adapted only for horse power. But why not use steam? Are there not boats already floating in every part of the habitable globe propelled by steam? If so, why not on canals? Some of the reasons, in my judgment, are as follows:

First, the boats now in use are not of the proper form. They must have a sharp bow, to prevent side swells. Mr. Hermanee's idea of a screw propeller is correct to a certain extent, but his adjustable bow would be impracticable. Mr. A. S. Ellis's iron tug is equally impracticable. How can his tug form a bow to the vessel, unless the propeller be in front? And if it be, will not the water, forced from the propeller, strike against the tug and retard its motion, and also divide the swell and send it against each bank of the canal? Will it not be troublesome in getting it through the locks, etc., in detaching the ropes and fixtures for fastening the tug to the boat? Will it not take time? Is not time money?

Second, the boats must have more than one propeller to prevent side swells. Construct your boats with a sharp bow. Place a small screw propeller on each side near the stem, and one immediately behind, which can very easily be done; then you will have a plan that is practicable. But, you say. "it will cost more;" so it will; and "take more power to drive it;" true, it will, a little. But how can this be helped? Is a common cart suitable for a stage, omnibus, or gentleman's carriage? Will not the boat and machinery have to be adapted to what it is intended to do? Another may say, will not three propellers to produce the same power make a greater swell than only one? No. Will three waves upon the ocean, ten feet high, produce a greater surf upon the shore than one thirty feet? or will three waves three inches high injure the canal banks more than one nine inches? I think not.

Weissport, Pa. S. HAGAMAN.

The Hartford Steam Boiler Inspection and Insurance Company.

The Hartford Steam Boiler Inspection and Insurance Company makes the following report of its inspections during the month of July, 1871.

There were 868 visits of inspection made during the month, by which 1778 boilers were examined—1489 externally, and 619 internally,—while 176 were tested by hydraulic pressure. The number of defects in all discovered was 665, of which 121 were regarded as dangerous. These defects in detail were as follows:

Furnaces out of shape, 33—6 dangerous; fractures in all, 40—19 dangerous; burned plates, 50—16 dangerous; blistered plates, 66—10 dangerous; cases of sediment and scale, 107—14 dangerous; incrustation, 116—14 dangerous; external corrosion, 34—8 dangerous; internal corrosion, 25—1 dangerous; cases internal grooving, 5; water gages out of order, 46—2 dangerous; blow out apparatus out of order, 5; safety valve overloaded, 18—6 dangerous; pressure gages out of order, 93—9 dangerous; boilers without gages, 4; cases of deficiency of water, 5—5 dangerous; broken braces and stays, 16—9 dangerous; boilers condemned as unsafe and beyond repair, 8.

In view of the defects which are revealed by the careful inspection of boilers, both internally and externally, we see no reason why boiler explosions should be attributed to "mysterious agencies." We must learn that boilers grow weak and deteriorate by use and age, and when this deterioration is hastened by poor setting, unreliable attachments, and bad management, is it any wonder that boilers explode? The work of corrosion is insidious, and its effect very dangerous. We have in this office a piece of iron less than $\frac{1}{30}$ of an inch thick, and the day before it was discovered, 80 pounds pressure to the square inch was used on the boiler from which it was taken. The boiler had been subjected to hydraulic pressure, and stood a test in excess of the stipulated pressure, but a slight blow of the hammer broke the iron entirely through. Inspection to be effective must be searching. It must be external, and internal, if possible, including attachments, feed, and blow apparatus, setting, and management of boiler. When careful examination reveals none of the defects enumerated above, we may look for comparative exemption from boiler explosions. If a boiler is weak in any particular spot, that spot will be more sensitive and affected by undue or over strain, than any other portion of the boiler, and this weakening process will go on to actual rupture, if not discovered and strengthened in season. When a boiler is under steam, with no outlets, a vast quantity of heat is stored up in the water, only waiting to assert its power when opportunity is presented. Steam is generated in a boiler from the fire surface and rises from the pressure of the cooler water above. This evolution of steam goes on until the prersure accumulated in the steam space over the water is so great that no more steam is evolved. This condition is called an equilibrium between temperature and pressure, but so long as the fires are kept up the water is storing up heat. Now suppose a sudden rupture releases this pressure in part, the potential energy stored up in the water immediately flashes into actual power, and the shock is sufficient to rend the strongest materials. If we consider heat as the source of power, and that the action of heat on matter is always attended by the production of power, we shall be enabled to form a tolerable idea of the force concealed in a large body of highly heated water.

HOME MADE CANDLES.—Many of our readers in the rural districts will find that candles can be made economically, by mixing a little melted beeswax with the tallow to give durability to the candle, and to prevent its "running." The light from a tallow candle can be improved in clearness and brilliancy by using small wicks which have been dipped in spirit of turpentine and thoroughly dried.

THOSE who use a plain, unstimulating diet, have little thirst.

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TERRIBLE GUN COTTON EXPLOSION AT STOWMARKET, ENGLAND.

The wholesale destruction of life and property by explosive agents which characterizes the present time, may well lead to the inquiry whether this sacrifice is demanded by the exigencies of modern civilization. Steam, gunpowder, nitroglycerin, dynamite, gun cotton, lithofracteur, these are the powerful genii invention has summoned to obey human will. But they are latterly showing that they can disobey, and take every opportunity to disobey, unless constantly guarded by the most rigid surveillance. Some of these, indeed, have a habit of going off without any apparent neglect on the part of those who use them. What a chapter of horrors the last two years has furnished! and now from England comes another which has not only destroyed many lives and much property, but has taught that we really know little of the nature of explosions, since one of the explosions occurred in a manner supposed to have been proved impossible by a long series of Government experiments. From *Engineering* we gather the following facts:

A most lamentable explosion occurred at Stowmarket, England, on Friday, August 11. The works of the gun cotton manufacturing company, in which Messrs. Prentice are the principal partners, are situated on a stretch of meadows about three quarters of a mile from the town of Stowmarket, in a northeasterly direction. On this strip of land were the mixing or dipping, and the drying sheds, in which the cotton is passed through the chemical solutions and dried. At the southeastern end of the grounds stood three magazines, about 12 feet long, 10 feet deep, and 8 feet high. The sides were constructed of wood, lined with canvas and paper on the interior, and the roofs were lightly covered in with slate. The magazines were built on wooden piles, and were placed 14 feet from each other, and between them were 9 inch brick walls rising higher than their roofs. They had neither windows nor skylights, the only openings being the single door in each. They were used to store the finished gun cotton until sent away from the works. At the time of the explosion each magazine contained about five tuns of the material, part of an order which was being executed for the English Government. At the northeastern end of the works, and about 900 feet from the three magazines, is a building similar in character to them, used as a store for rifle cartridges. About 130 hands, men, women, and children, are employed in the establishment, and they had just resumed work after the dinner hour, when a fearful explosion occurred on the site of the three magazines to which we have alluded. To those on the works who are able to give any account of the occurrence, there appeared to be but one explosion, while in the town of Stowmarket, three distinct explosions were heard to follow each other in very rapid succession. The work people rushed from the tottering sheds around, only to be killed or injured by the falling *débris*.

Soon after the explosion, Mr. E. H. Prentice, one of the directors, and who is the manager of some neighboring chemical works, and Mr. W. R. Prentice, second son of Mr. Manning Prentice, were on the spot. They proceeded to collect the workmen, and with them set to work to save such of the buildings as still remained, but which had taken fire. Relying on the results of some experiments which had been carried out to prove the gun cotton, as now manufactured, to be non-explosive except by percussive fire, Mr. E. Prentice was engaged in removing boxes of cartridges from the flames, being assisted by his nephew. Although warned of danger, he still continued his fatal work, when one of the boxes exploded. This explosion completed the fearful work of destruction, and the remainder of the works was rendered an easy prey to the flames. The latest accounts place the number of persons killed by the disaster at 24, the number of wounded being 72, and it is possible that some names in the latter may go to swell the former list.

[For the Scientific American.]

THE SURF.

BY CHARLES MORRIS, OF PHILADELPHIA.

How many of the great army of pleasure seekers who have this summer wandered upon the sea beach, have seen any mystery in the breaking of the surf, or questioned the origin and character of the mighty force there displayed? Probably not one in a thousand has considered the subject worthy a thought, and not one in ten thousand has understood it. Of course, all have a general idea that the surf originates in the dashing of the wave upon the beach. But a wave is a simple elevation and depression of the surface of the water, without any permanent forward movement; the surf, on the contrary, is a permanent forward movement. The question arises, how the one condition is changed into the other.

The seeming forward motion in the waves is simply the progressive motion of the force that produces them. This force exerts itself on successive portions of the water, one rising as the other sinks to rest. Each particle of the water, after describing a vibratory or circling path under the impulse of this force, comes to rest at the center of its motion while the force, traveling onward, disturbs new particles. Thus the quantity of force remains permanent, while the locality constantly changes.

This force tends to produce motion in all directions, and moves forward from the fact that a continuation of the wave motion resists its backward movement. It has also an effect on the water below the surface, acting downward until the accumulated resistance balances the motive force: the effect of this resistance being aided by the greater facility of surface propagation.

It is this downward influence of the wave force to which the phenomenon of the surf is due. The wave, traveling shoreward, in time reaches water so shallow that the downward impulse of the force extends to the bottom. Thus the elastic resistance of water is exchanged for the rigid resistance of the solid bottom, and the force is reflected upward. It is this elastic reaction that lifts the water, the wave being prevented from having its full extension downward. As the water grows shallower this effect increases, so that the waves rapidly increase in hight.

But now the bottom of the wave is dragging, as it were, upon the sand. Thus a frictional resistance hinders the ready communication of force from particle to particle at the bottom, and the onward motion of the wave force is delayed. This resistance of friction has little or no effect on the surface particles, its influence continually decreasing upward. Hence the wave force is now moving onward more rapidly at the surface than at the bottom. The wave, in consequence, slants forward, eventually toppling over from the force of gravitation.

Now the motive force of the wave, which has hitherto been communicating itself regularly from particle to particle of the water, is prevented from doing so by this disturbance of the regular vibratory motion. It, therefore, acts with its full progressive vigor on the portion of water last affected, driving it bodily forward, until the force is balanced by the counter effects of gravitation and friction. The wave force thus eventually becomes changed into the heat of friction, or is partly employed in abrasion of the sands, and partly in producing the potential energy of lifted water.

The surf, where the wave breaks upon a bar, is similarly caused. But the water which is dashed forward by the propelling force, meeting deep water within, experiences an elastic resistance to its forward motion. It is thus brought to rest, and its movement communicated to the water in advance. Thus a continuous communication from particle to particle recommences, and the wave is reformed. Of course, the friction upon the bar employs a portion of the force, the quantity of which lost force depends upon the shallowness of the water. Hence the wave is always lower inside the bar.

In case the surface of the bar reaches very near the surface of the water, the friction uses up nearly all the propelling force of the wave, and the water within is nearly or quite smooth.

What an immense force is thus, day after day, and century after century, expended as friction upon the sea beaches of the world, employed in grinding solid rock into the huge accumulations of sand found every where throughout the earth!

The Effect of Sun on the London Asphalt Roads.

Should we be favoured with a continuance, or an accession in intensity of the summer heat, the watering cart or hose will be as necessary appendages for maintaining the solidity of our new roadways as they are in laying the dust on our old ones. A plastic asphalt surface is in no wise desiderated or coveted for vehicular traffic, and it would be an unfortunate event if, after all the cost, obstruction, and delay that have attended the introduction of our latest, and still most useful road material, to find it fail in the most useful essentials, namely, the retention of its hardness and body, under all conditions of the atmosphere. After all, the hot weather may not have come in vain, if it gives us a good and timely opportunity to benefit by its occurrence, in the improvement of our road construction, and in the better selection and manipulation of the present and similar material for the future. Experience teaches, it is said; but the right of way is often blocked by vested interests, which neither shower nor sunshine has been found to materially affect. In the present instance perhaps the power of the sun will turn men's minds nearer to a conviction of the truth than the power of the pen, and those who more immediately interested will improve and profit accordingly. We need scarcely say that our remarks are not made in disparagement of the asphalt pavement, but as a hint to further practical efforts for the direction of improvement.—*Builder*.

Manufacture of Telegraph Cables.

Mr. Henley's works at North Woolwich, Eng., cover fourteen acres in extent, employ at present only 1,100 to 1,200 hands—being rather slack—2,000 being the normal number, and can turn out at present some 100 miles of cable weekly, with prospective power of increasing that quantity to 250 miles; it thus will be seen that this is a factory of no ordinary kind or magnitude. In the core there are six copper wires stranded around a central one, making seven in all. These are tinned over, and completely sheathed with an insulating covering, varying in material and thickness, either simple or compound; in the former case being composed entirely of gutta percha in a solid mass, in the latter, of felted tape wound round the wire in two bands in opposite directions, and finally encased under compression by rollers, with a thin seamless sheathing of india rubber (or similar material). Of the two, the latter is by far the most perfect insulator or mode of insulation, whereas the former has hitherto had the preference, from considerations of cost; but now it is believed that the superior material, india rubber, can be brought into successful competition with its cheaper and inferior rival, even from a financial point of view. The core so prepared in either way, has then spun around it two successive yarn sheathings, in numerous strands, varying according to the purpose in view, which supply a bed for the true cable, in point of strength, as contrasted with the electric cable element, the core. Round the whole are spun or twisted stout galvanized iron wire strands, also of varying number and size, as may be required, over which again are wound, in opposite directions, two fine strands of jute yarn, firstly with a resinous compound containing silica, and ultimately with a seething tarry compound, cooled and hardened, by a stream of water, in the gripe of a set of roller wheels, compressing and finishing off the whole. Whence issuing, the cable is coiled within the tanks, in successive rings and layers. The method of applying the asphalt coating by means of bucket wheels or turbines, in reverse operation. is most ingenious, effective, and noteworthy.

The description applies to the formation of a single cable, as well as to a multiple cable, with this difference, that in the latter case several of the insulated cores of stranded tinned copper wire are twisted in combination with other strands of yarn into a compound core, which then receives the outside sheathings of yarn and galvanized iron wire.

A remarkable feature about these telegraph works is that they are almost entirely self contained, so that nothing is required beyond the raw materials worked up in the manufacture, the metals, iron, copper, and zinc, the acids and chemicals, the jute yarn, and the insulating substances. The drawing of the wire, the annealing, acid cleansing, galvanizing and drying thereof; the stranding of the core; the preparation and completion of the insulating sheaths—every initial intermediate, and ultimate stage is conducted and carried on, every process provided for and executed; and all the machinery for the purposes, and even much of the very buildings which cover and contain the work, is manufactured and put together on the premises excepting prime movers.

The motive power is mainly obtained from duplicate 75 horse power horizontal steam engines, of the ordinary type with some special features.

Improved Miter Box.

Mr. George E. Hedges, of Ashland, Nebraska, has invented an adjustable miter box, designed to improve the means for maintaining miter saws in their true position. A bed plate sustains a semicircular platform on which the piece to be sawn is laid. A flange on the straight side of the platform, forms an angle for the piece to rest in, as that of all miter boxes. This plate or platform is pivoted at the center of the circle to the bed plate. The box turns on this pivot, and may be secured on the bed in any desired position, so as to saw a piece of wood at a true miter or any other angle. The saw line passes at a right angle across the bed and directly through the central pivot. There are two uprights at each end of the saw line, connected together at top and bottom, but in such a manner that one of each pair is adjustable toward or from the other, so that the saw guides may be made to suit saws of different thicknesses. These guides are connected together at their top ends, and are attached to the uprights so as to slide up and down and govern the saw. A saw back is attached, between the guides at their upper ends, to the saw by a set screw, and supported in position by two arms, of which the first receives the saw near the handle, and the second is adjustable on the back. The saw and back being thus attached, the teeth are thrown below the guides to prevent injurious contact with the metal. The upright posts and guides are made of metal, and are consequently not liable to get out order like miter boxes made of wood. The guides with the saw back are suspended from the top of the uprights by light springs, but so that while their weight will be supported, the saw will work down into the wood with but slight pressure. We regard this as an excellent invention simple and practical.

Ripping Tool.

This invention relates to a new and useful tool for ripping seams sewn in cloth and for other purposes. This tool is a small flat instrument, of steel or suitable material, with a wide notch in one end, in which a oblique knife edged cutter and a clearance for the shreds are formed on the bottom of the notch, while prongs or projections at the sides of the notch form guides for keeping the seam to be ripped on the knife edge, each guide being different from the other, and adapted for a seam differing in some respects from what the other is adapted to. The handle or stock of the instrument is provided with a notch adapted for use as a wrench; also a hook and a niche, whereby the said implement is adapted for several uses in connection with sewing machines; the object of the invention being to provide a simple and efficient implement which will act by a shear cut, instead of the direct jam cut common to other ripping tools, in which the cutting edge is presented perpendicular, or nearly so, to the seam; and also to adjust the seam or cause it to assume the proper relation with the cutter as it is brought to the cutting edge. This handy little instrument is the invention of Justus O Woods, of New York City.

HAND TURNING.—The Company of Turners, in London, purpose to establish an annual prize for technical skill. The prize will be in the form of the company's silver medal and and the freedom of the company and of the City of London, and will be given for the best specimen of hand turning in the yeor. This year the competition will be in turning in wood. It is provided that the specimens shall be delivered at the Mansion House in the first week of October, and that they should not exceed 18 inches in hight and 1 foot in diameter.

PROPOSED TEST FOR STEEL AND IRON.—Mr. H. A. Walker, of Tarboro', N. C., proposes that the scintillation of iron and steel filings, when put in a fire, be made use of to test the quality of the metal. The different degrees of brilliancy, as well as the readiness with which the filings sparkle in the fire, are suggested by Mr. Walker as proofs of the varying purity of the iron or other metal. The test is handy and convenient, and might be of some practical value.

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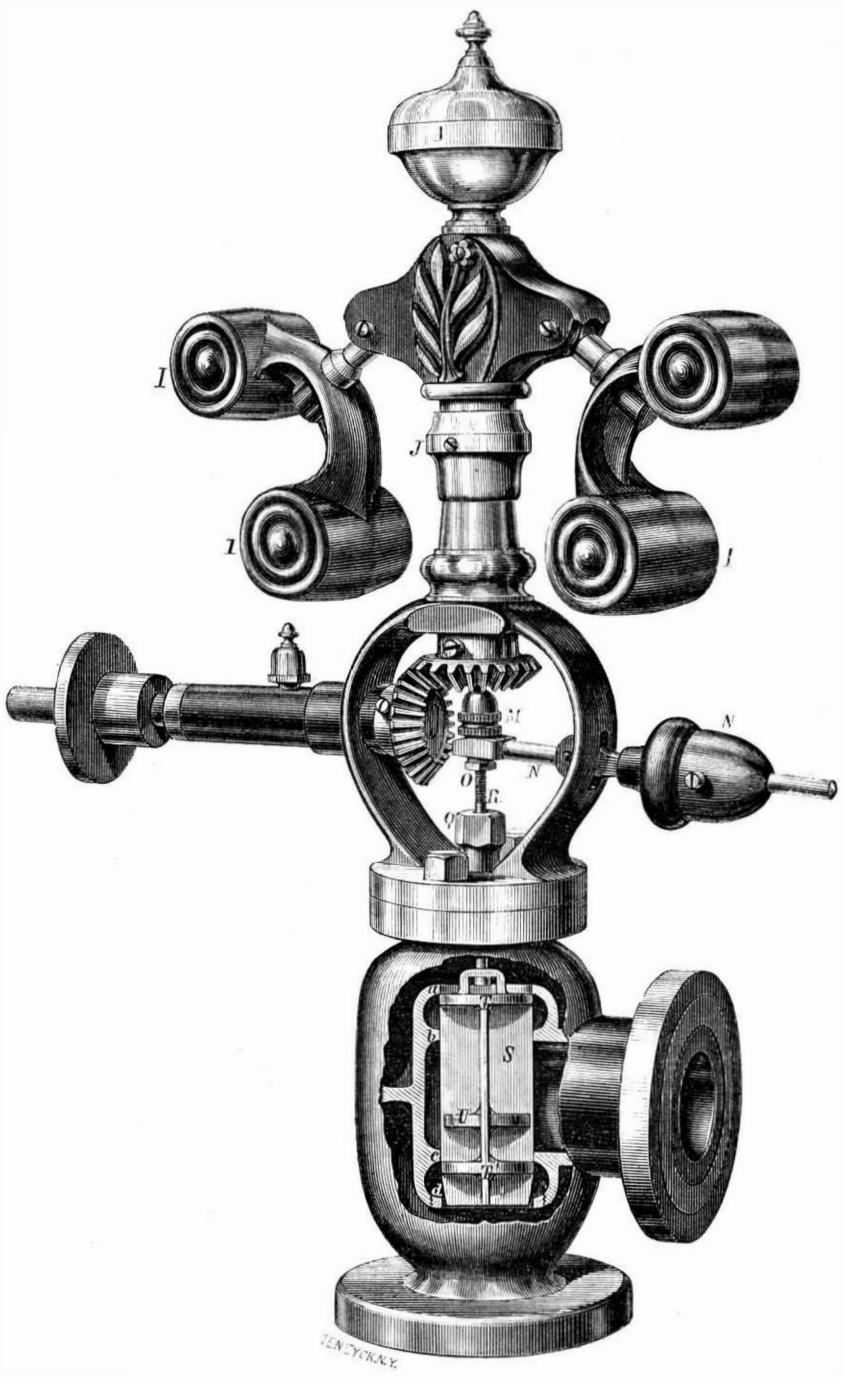
Patent Safety Steam Governor.

The one prime necessity in a manufactory using steam power is a good governor on the engine; a desideratum which the experience of every one, who has used steam any length of time, proves, has not been easy to obtain. The main difficulty has been that governors were not sensitive enough to the changes of load on the engine to prevent too much change of speed. Cotton and woolen mills, and flour, paper, and saw mills are especially troubled in this particular, as each makes large changes in the load suddenly, and each needs the most regular speed. The engraving herewith illustrates a governor, called by the inventor the "Acme," which would seem to meet all these requirements and difficulties, beside being a safety governor, as, in case of breakage or throwing off the governor belt, no "runaway" can occur.

Two difficulties have been found to exist in governors, both or either of which would prevent proper speed. The first was the construction of the upper or governing works, so that in motion they were bound, or else would work quicker one way than the other, cutting off steam quicker than letting it on, or *vice versâ*, when needed, thereby causing the engine to jerk and run much above and below its regular speed at each change of load. The second cause was that when steam was passing through the governor, the valve (although theoretically balanced) was forced out of balance, thus causing a variation of speed corresponding to the unavoidable changes of pressure of steam, and also continual antagonism between the valve and the governing works.

Referring to the engraving, the novel construction of the revolving weights, I, is designed to produce a quick response to any change of speed,—the theory of the inventor being that the lower part hangs in the proper position—nearest under center of suspension possible—to swing outward the most readily should the load be thrown off; and the upper part is in the best position—nearly on a parallel line with center of suspension—to exert all its weight downward, instantly, in case of slackening speed. It may seem that the power required to raise the upper part of weight, I, would balance its usefulness; but it is claimed that the power required to raise the weights when in motion is small, and of course gravitation compels them to act with their whole weight when required. In the brass case, A, is a volute spring, which is compressed by a thumb nut attached to the valve rod, tightening or loosening of which alters the speed of the engine. But the main object is a valve, balanced under all circumstances. S is a four winged valve, having two regulating disks, T and T', and a smaller balancing disk, U. The valve case has four ledges, *a, b, c, d*. When in operation T and T' are nearest *b* and *d* respectively. Steam passes up under T, and over and under T'. The action of the steam on T is to force it upwards; on T' to draw it downwards, a little more than overcoming the upward strain on T; to meet which, the smaller disk, U, is placed so that the steam acts between it and ledge, *c*, just enough to balance the difference between the regulating disks, as described, so that no matter how much or little steam is passing, or what the pressure is, the valve is always balanced, and the upper works have only to overcome the friction of the packing at Q, in raising or depressing the valve, the weight, N, just balancing the weight of valve, and used for no other purpose.

If the governor is stopped by disarrangement of belt or otherwise, the disks, T and T', are drawn up, as seen in the engraving, and the steam is throttled at ledges, *a* and *c*. This governor was patented October 11, 1870, and February 21, and August 8, 1871, by J. D. Lynde, 405 N. 8th Street, Philadelphia, Pa., where he can be addressed for further information. We are informed it will also be on exhibition at the Fair of the American Institute in this city, during this and next month.



LYNDE'S PATENT STEAM GOVERNOR.

Implement for Stretching Shoes.

Dr. Dio Lewis says: "Within three blocks of my Boston residence there are eleven corn doctors. Some of them employ a number of operators, and do an immense business. A large majority of adults, among the better classes, suffer from corns, or other maladies of the feet."

The inventor of the instrument illustrated herewith, Dr. E. R. Bardin, is a practicing surgeon and physician at Newburgh, N. Y. Having had his attention strongly called to the numerous diseases of the feet resulting from the irrational style of foot gear now in vogue, and finding great difficulty in getting shoemakers to make boots and shoes according to the necessities of individual cases, and also difficulty in getting patients to wear properly shaped shoes, he was led to invent some means whereby boots and shoes may be efficiently stretched so as to relieve diseased feet.

The stretcher shown in the engraving is the ingenious and scientifically constructed device resulting from his study of the subject.

The general principle of the invention is that in order to stretch any one part of a boot or shoe effectively, all the slack leather in the upper must be first stretched, so that it will not, by its yielding, defeat the stretching at the exact point it is desired to enlarge. The operation of the stretcher is, therefore, first to draw all the leather tight, and afterwards to stretch the particular portion which is too tight to the foot.

Fig. 1 represents the instrument as constructed for men's boots. It consists of pieces A, B, C, D, and E, all formed of nickel-plated cast iron, and connected with sole piece and system of levers, links, and inclines in the interior, not shown.

The piece, E, is only used when it is necessary to enlarge the heel to relieve a tenderness which often results from too stiff counters.

The holes represented in B are for the attachment of leather bunches, by pegs, in order to enlarge portions over tender corns, bunions, etc.

The key, I, is used to operate the instrument, being applied at either T, G, or H, and producing the following effects:

In stretching the boot lengthwise after the stretcher is inserted, the key is applied at H. It is then oscillated from side to side, which actuates a ratchet and screw, and separates the toe piece, C, and the heel piece, D, till all the longitudinal slack is taken up.

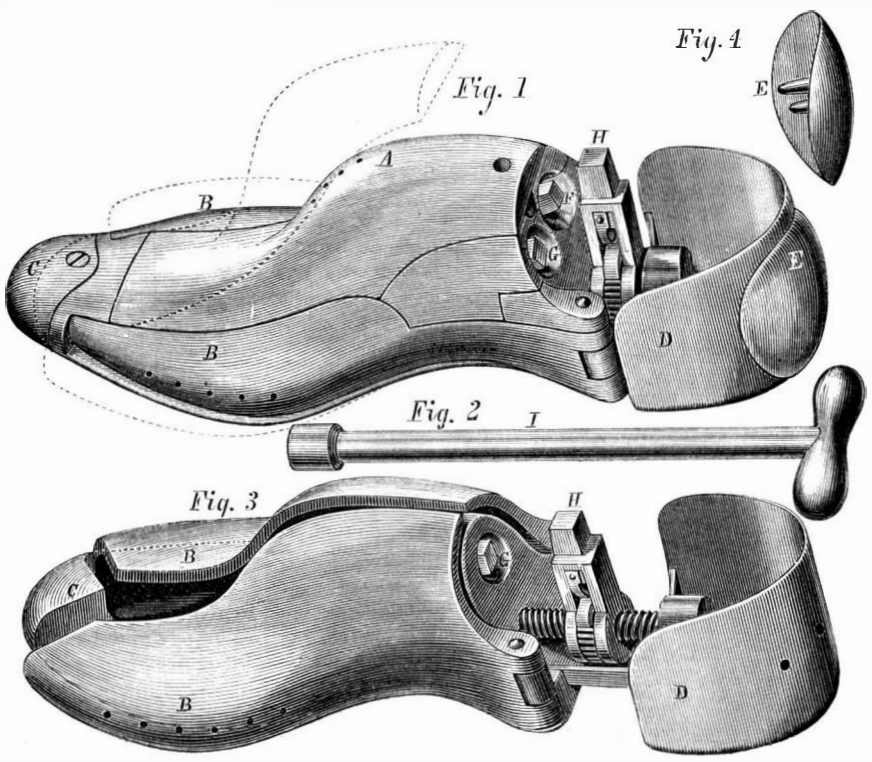
The key is next applied to F, and turned about like an ordinary bed wrench. This actuates mechanism by which the instep piece, A, is elevated, and the slack leather taken up in that direction. Applying the screw to G, and turning it in a similar manner, the side pieces, B, are forced apart. The order of moving and extent to which these pieces are thus moved is varied according to the effect desired.

Fig. 3 is the form of the instrument employed for ladies' boots which open upon the instep or at the side of the ankle. In this form, the instep piece is omitted, and the side pieces enlarged to fill the vacancy.

The pawl on the piece at H is double acting, and is used to reverse the motion of the screw, so as to draw the heel piece towards the toe piece, when it is desired to take out the stretcher after the boot is stretched.

In conclusion, we may say that having, by the use of this stretcher, made a pair of intolerable boots quite easy and comfortable, we conclude that it is an excellent device for the purpose intended.

Patented June 13, 1871. The entire right, or portions, will be sold. For further particulars address Dr. Bardin, as above.



DR. BARDIN'S SHOE STRETCHER.

Improved Bee Hive.

This hive is made of wood, of suitable size and proportion. One side is hinged and swings open so as to expose the interior and allow of the removal of the honey frames and boxes. The top of the hive is also hinged, and is fastened down by hooks. Ventilators, which revolve on central screw pivots, each having one or more orifices which register, with fly holes, are used (by turning or revolving them) to either allow the bees to pass through, or in and out, or close the holes. The ventilators in the upper portion of the hive have a screened orifice, which allows air to enter but excludes the bee. The friction of the ventilator on the outside of the hive is sufficient to hold it in any desired position. The honey frames are made with double beveled cross bars, and placed side by side in an upright position. The upper cross rails of every alternate frame are dropped down, which allows a free passage upward between the frames, not only for the bees but for ventilation. The honey boxes have slat bottoms through which the bees gain entrance to them. By dropping down the upper cross slats of every other frame, the bees, the heat, and the air are allowed free access to the honey boxes.

The slats of the bottoms of the honey boxes correspond with and cover the top rails of the alternate frames. The bees by this arrangement are prevented from attaching the comb formed in the honey boxes to the rails of the frames. The hive is so ventilated, and the frames are so constructed and arranged with regard to each other, that free access is given to every portion of the hive, and the interior is kept at an even temperature. William M. Henry, of Leo, Indiana, is the inventor of this hive.

Bearing Plates for Railway Rails.

It is the object of this invention to provide means for preserving the ties or sleepers of railroads; and it consists in a metallic plate of any form disconnected entirely from the chairs and from the rail, except so far as it affords the latter a bearing.

This bearing plate is adapted to various other purposes than separating the rail from the tie of railroads. It may be used for bridges and platform timbers, and for separating cross timbers, for the purpose of diminishing the actual bearing surface, and allowing water or moisture to be absorbed by the atmosphere. Elijah Myrick of Ayer, Mass., is the inventor of this improvement.

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RIGHT OF PROPERTY IN INVENTIONS AN ABSTRACT RIGHT.

There once lived in England a famous writer upon civil law, whose wise teachings have, until quite recently, been accepted as almost the very foundation of legal lore, both in England and America. Wherever civil law is studied, "Blackstone's Commentaries" are—or, we should say, have been—considered as one of the most logical and rational expositions of the social rights of mankind ever penned. However, in the land of that celebrated thinker and most able expositor, there has arisen a new school who reject his teachings, and publish to the world a directly opposite doctrine to that which he taught.

Blackstone told us, so forcibly and with such solid argument, that the natural rights of individuals were only such as they had individually the power to maintain, that this principle has become almost a legal axiom. He taught, further, that the civil rights of individuals in society are only such as are granted to them by and in the society of which they are members, in exchange for the natural right they possess to seize and hold whatever they desire, and to force others to obey their will, in so far as they naturally possess the power to seize, and hold, and compel. Where individuals are possessed of, and employ, all their natural rights, there can be no society. The moment even two combine against a third, they do so by the agreement to let each other alone temporarily, and by so doing form a society, and surrender for the time some of the savage freedom they originally possessed to kill or maim any weaker than themselves, or to take and retain anything they wished, so long as there was no one strong enough to get it away from them.

The civil right of the weak, to have and to own property, has been obtained by their agreement to leave unmolested the possessions of those still weaker. In other words, the members of society mutually agree to let each other alone in certain particulars, and the terms of this agreement constitute civil law.

The recent vigorous discussion of the patent system in England has elicited many singular views, but none more absurd than the one that inventors have a natural and inherent right to exclusively use and enjoy the profits of their own inventions.

As a sample of this absurd doctrine, and because it expresses very briefly, yet fully, opinions that have occupied much space in our English exchanges, we quote the following from the *Mechanics' Magazine*:

It is surprising that a man's right of property in his own invention should be denied by men of reputed intelligence. Nothing seems to be more in harmony with the principles of equity than that this right should be conceded. There are some who absolutely repudiate the idea of abstract rights, and they are skeptical in regard to all rights save those established and guarded by law. By a kindred class of logicians it is argued that an exclusive right in the mechanical creations of the brain is opposed to the public good. On the common ground of honesty such an argument may safely be deemed absurd. Why, in various departments of enterprise the right is already virtually admitted. At a recent meeting of London Patent Agents, the right of inventors to the sole use and disposal of their inventions was emphatically declared, and it was further urged that this view of the question ought to be authoratitively recognized by the Legislature. It is rather difficult to see how the extension of right to the individual can prejudicially affect the interests of the community. The right of property is a sacred heritage, but if this right is refused to the personal achievements of inventive genius we have, as the result of such a course, an unjust anomaly."

Now these "London Patent Agents" are many of them intelligent men who must, it would seem, be blinded by self-interest to give utterance to such an absurdity.

There is no natural and abstract right to any property whatever, except the power to grab it, and to keep out of the way of some stronger grabber, a right which a wild beast possesses just as much as a man. All other rights are mutually conceded from motives of policy. To grant to inventors the power to exclusively use their own inventions for various periods of time, has been justly deemed by most enlightened modern governments a wise policy, tending to encourage invention, and thus to ultimately secure for society at large—not merely the individual himself—the benefits of improvements that would otherwise not be made, or, if made, would, for the benefit of the inventor, be held secret as long as possible.

Inventors have found that this limited protection is better than anything they can do to protect themselves; so they have hitherto been glad to agree that they would surrender their natural right to hide and conceal, as best they might, their discoveries and devices, for the privilege of selling to others part or all of the right accorded them by the government, or of using the same freely and unmolested for a term of years, more or less, in a free and public manner.

It is conceded that an inventor has the natural right to secrete his invention as long as he can; when, however, it is discovered, and others see fit to use it, he has no recourse unless he has taken measures to secure an exclusive right from the society in which he lives, for such time as society sees fit to grant it. His natural right to slay the discoverer of his secret, or to threaten the latter with violence in case he reveals it, or uses it, has been surrendered for personal immunity from violence or threatening on the part of others.

In short, the whole question of "Patents or no Patents," resolves itself into the simple question whether it is good policy to grant them or not. This is solid ground upon which to argue the question, and the only solid ground.

We believe the policy has been demonstrated to be a wise one in this country, and that it would, if properly carried out, have proved a wise one in every civilized land. That some European systems are defective, and have led to injustice and tedious litigation, cannot be denied, but it is the method, not the principle, that is at fault. And we believe that, with all their defects, these patent systems have greatly benefitted the countries in which they exist.

THE ORIGIN OF LIFE.

The present is the most active time, in the history of the world, for speculation of all kinds; and thinkers and theorists are straining their attention in all directions, to find some new fact or combination of facts which may help to elucidate the most important and greatest of all scientific questions: How did life begin on this planet? The labors of Huxley and Pasteur—and also of Bastian, although this eminent *savan* commenced by attempting to prove the possible spontaneity of life—have demonstrated, beyond all controversy, that all organisms receive their life from other life; that every living thing (and this term must now be taken to include the products of fermentation, the germs of disease, and many other natural formations not formerly regarded as instances of organic life) is in existence by means either of generation or separation from another being of the same order. We have thus a simple explanation of the manner in which the lowest of living creatures, such as *fungi* and sporules, are endowed with vital force. The myriads of instances of these growths which we see all around us are but "the present generation," having derived life from some now passed away, and standing ready to communicate it to others that are yet to come. The theory of spontaneous generation is now disregarded, the strong light thrown by modern science upon the varied means of communication of vitality having shown us a more excellent way.

But while this simple and truthful account of the continuance and propagation of life is recognized by all honest and candid students, the primeval origin of the vitality which is thus continued and diffused, remains an open question. It is the final result of all speculation and investigation to reach a point where it can go no further, and where the wisest must bow his head in reverence, and acknowledge his weakness and inability.

The temerity of the unwise is proverbial; and it is not encouraging to the many enthusiastic believers in the glorious nineteenth century, to find that a most prominent philosopher, a man well versed in most branches of science, an electrician of the most profound knowledge as well as ingenuity in invention, and chosen to preside over the session for 1871, of the British Association for the Advancement of Science, should have made a "flying shot" at the stupendous problem, and have succeeded only in eliciting expressions of regret from the friends of knowledge, and of derision from her foes. Sir William Thomson says:

"When a volcanic island springs up from the sea, and after a few years is found clothed with vegetation, we do not hesitate to assume that seed has been wafted to it through the air, or floated to it on rafts. Is it not possible, and if possible, is it not probable, that the beginning of vegetable life on the earth is to be similarly explained? Every year thousands, probably millions of fragments of solid matter fall on the earth—whence came these fragments? . . . . . Hence, and because we all confidently believe that there are at present, and have been from time immemorial, many worlds of life besides our own, we must regard it as probable in the highest degree that there are countless seed bearing meteoric stones moving about through space. If, at the present instant, no life existed on this earth, one such stone falling upon it might, by what we blindly call natural causes, lead to its becoming covered with vegetation. . . . . The hypothesis that life originated on this earth, through moss grown fragments from the ruins of another world, may seem wild and visionary; all I maintain is, that it is not unscientific."

Language fails us when we try to describe this extraordinary farrago. The professor has nothing to say for his idea, but that it is an idea; he has no evidence, and he is not likely to find any, that any meteoric body ever had a single organic attribute; he disdains to explain away the fact that these bodies are, by friction with the atmosphere, heated, as they approach the earth, to such a degree that any vegetable germs in or upon them would certainly be destroyed; and he altogether forgets the trifling point that his theory brings us no nearer to the origin of life than we were before. It must after Sir William Thomson has left it, still remain open to discussion and speculation; and the question, "What is the origin of life?" will continue to interest us by its importance, and to awe us by its magnitude, long after the President for 1871, of the British Association, has passed away.

Before quitting the subject, we must enter a protest against Sir William's closing sentence. His hypothesis, unlike his germs of life, is a spontaneous emanation, and not a legitimately derived product; and he has for once forgotten his Bacon, and tried to discover new truth which does not grow organically out of old. And when we find him thus striking at the first principles of scientific investigation, we are not surprised to hear him say that a statement may be wild and visionary without being unscientific. It is because his theory is wild and visionary that it is unscientific. The wild and visionary speculators are the worst foes science has to encounter; and it is to be regretted that, on the subject of the origin of life, Sir William Thomson must be reckoned among the number.

JAPAN A FIELD FOR INVENTIONS AND MACHINERY

This country, comprising in its empire the three islands of Japan (called, in Japanese, Niphon), Kioo-Sioo, and Sikoke with many smaller ones, possessing a population which has been variously estimated up to 50,000,000, and a territory of over 163,000 square miles, has many characteristics which render it interesting to us. Of these the chief must be considered to be the accessibility of its people, and their willing recognition and encouragement of the introduction of modern improvements and inventions from our own and other shores. While the bulk of the Mongol Tartar race, the Chinese, have an abject fear of a foreign manufacturer or producer, and place an almost impenetrable barrier of "protection" around their enormous empire, the Japanese are courteous to visitors, and always ready to adopt any foreign product, if it be likely to prove useful to its industrious and ingenious people. Consequently, the benefits of the superior civilization of the United States and the kingdoms of Europe are being brought to the knowledge of the Japanese people with a rapidity unknown in the history of any Oriental nation, and we propose to describe a few of the innovations lately made in this remarkable empire, which is likely to become in time a valuable and potent ally of the Anglo-Saxon countries.

The appointment of Mr. Capron, late Commissioner of Agriculture in the United States, to a similar office in Japan, has been already commented upon in our columns; and of many steps taken by the Government, that is perhaps the most important and the wisest. The country being thickly populated, the soil has been closely cultivated, without, however, encroaching on the lands set apart for maintaining the supply of timber, which latter named proceeding many of our Eastern States would do well to adopt. But in farming implements and machinery, as well as in stock breeding, there is room for vast improvement; and the knowledge and judgment of Mr. Capron will prove of eminent service in all these branches of agricultural science. A cotemporary (the San Francisco *Bulletin*) points out that cattle and hog raising will not be likely to make great strides in Japan, as the people eat no meat, being devout believers in the transmigration of souls; but advancing civilization will probably eradicate this superstitious fanaticism.

Major Warfield, engineer, Dr. Austisell, geologist, and Dr. Eldridge, are also commissioned by the Japanese authorities in a similar manner. A school of medicine in all its branches has been established, and two eminent European professors have gone out to superintend it. And a postal communication has been formed between some of the most important places, and its extension to the country at large is a question of a very short time. The manufacture of coal gas, and the illumination of cities thereby, has long been carried on; and a discovery of a very different kind, namely, vaccination, must be added to the list. The importance of the latter as a prophylactic is well understood in Japan, and its practice is compulsory, and enforced by fine and imprisonment. A large foreign commerce will be assured to the people by their possession of large coal deposits, in the neighborhood of Nagasaki, a port which will soon be frequented by the flags of all nations, in search of fuel, so valuable and so scarce in all parts of the Eastern world.

With a country of singular beauty and fruitfulness, inhabited by a race of people now beginning a second life in the history of the nations, we cannot doubt the Japanese empire has a golden future before it. The American citizens who are there, and who have so highly useful a career before them, will no doubt keep us informed of the progress they are making; and news on the subject will be regarded with great interest by the public in general.

A NEW RAILWAY, 26 miles in length, has just been opened between Lowell and Framingham, Mass. The completion of this link establishes a direct railway line between Portland Me., Lowell and New York. The road passes through severa important places, and affords long needed facilities of communication to a large population.

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SPIRITS AT A DISCOUNT.

In ancient times every unusual freak of nature was attributed to the influence of invisible spirits. If there was anything which could not be explained upon ordinary principles, it was very convenient to ascribe it to these mysterious agents; and as one after another of the phenomena yielded to the touchstone of science, the domain of the spirit was more and more narrowed down until of late years they have almost exclusively been confined to table turning and mysterious communications from the other world. We now hear of a vigorous attack being made upon the last stronghold of spirits by the inventor of what is proposed to be called "Psychic force." Henceforth tables will be turned, musical instruments played, rappings heard, photographs taken, all of which proceed from the soul of the medium who exhibits the performances, and there will be no further occasion to call up any assistance from the vasty deep. This psychic force, proceeding from the will of the operator, it is said, can exert power over matter, it can overcome the force of gravitation and do many things that would require the intervention of the steam engine, or magneto-electric machine, or some other contrivance known to mechanics and physics. It is proposed to dispense with spirits hereafter and to explain the phenomena hitherto attributed to them upon common every-day principles. This is hard on the spirits, and will greatly interfere with a large class of persons, who have lived off them for a number of years. We are led to these observations on account of the publication of an elaborate article, by William Crookes of London, on the new force, reprinted in the SCIENTIFIC AMERICAN. Mr. Crookes has had an interview with the celebrated medium Home, and appears to have been regularly taken in by that adroit performer. As a result of the interview we have an article in the *Quarterly Journal of Science*, describing how an accordion was played without being touched, or how a lever was made to excite a force of six pounds by the simple laying on of hands.

As Mr. Crookes is unwilling to ascribe these performances to spirits, he proposes to establish a new force, to be called "Psychic," and to admit that by the simple exercise of will we can cause bodies to move and musical instruments to be played. Mr. Huggins, who was present, does not venture to express an opinion as to the cause of the results that occurred; but Mr. Cox, a lawyer, was so impressed by them that he wants to have a "Psychological Society" at once established for the promotion of the study by means of experiments, papers, and discussions, of the new science. We shall now probably hear of an animated contest between the psychologists and the spiritualists. The latter will naturally object to being so summarily dismissed from the stage, and will make a bold fight for the rescue of their faith. And it is possible that some good may result from the discussion. What the precise difference between the psychic force of Crookes and the odic force of Reichenbach is, we are unable to say. We have our suspicions that they will prove to be one and the same thing, and that it will only be necessary to unearth the Reichenbach literature to obtain all that we may wish to know on the subject. A psychic engine would be a marvelously convenient thing to have about the house, provided some member of the family proved to be a medium capable of running it at will. If there is anything in the new force we see no reason why such an engine may not be invented as a substitute for steam or water power.

Seriously, it appears to us that the constant recurrence of so-called spiritual manifestations in one form or another ought to be made the object of special study on the part of physiologists, to whose department this class of phenomena appears to belong. In what way a portion of the brain can be made unusually active, while other portions are asleep, and how to explain unconscious cerebration, are matters quite worthy the attention of physiologists.

Instead of founding a psychological society, it would be more appropriate to establish a physiological: in either case it is time to let the spirits rest, and to account for all phenomena on scientific principles.

WAGNER'S REPORT ON TECHNOLOGY.

The sixteenth annual report on the progress of chemical technology, by Professor Rudolph Wagner, has just appeared. It is a good specimen of the exhaustive research and careful study of the Germans, and is the best book of reference for recent discoveries with which we are acquainted. We have here a volume of 824 closely printed pages, illustrated by 122 handsome woodcuts; giving an account of the latest improvements in chemical technology, not in mere catalogue form, but in abstracts, and with critical observations and reference to previous authorities on the same subjects. The author classifies his subjects into eight groups: 1. Chemical metallurgy. 2. Chemical manufactures. 3. Chemical preparations, organic and inorganic. 4. Glass, porcelain, lime, gypsum, cement, mortar. 5. Technology of food. 6. Technology of textile fabrics, aniline colors, calico printing and bleaching. 7. Dye stuffs, varnish, cement, and rubber. 8. Fuel and light. All of these topics are carefully discussed, and we doubt if anything of importance has escaped the scrutiny of the author. All important facts are authenticated by reference to the original sources of information, and in every instance the journal is cited in which the reader can find the whole subject. There is no book in the English or French language corresponding to Wagner's report; and it is a pity that the great expense must deter any publishers from attempting its translation. The book opens with an account of the rare metals thallium, zirconium, magnesium, aluminum, jargonium, natrium, strontium and iridium. Seven pages suffice to tell us all that has been done for these metals during the year. Thallium can be best preserved sealed up in a tube in water which has been previously boiled; it then remains bright for years. Zirconium is easily prepared by reducing the double fluoride of zirconium and potassium with metallic aluminum. Magnesium is recommended to be used as a reducing agent for nearly all metals, and aluminum is also highly commended for the same purpose. Jargonium is said to have no existence. Strontium is best prepared from its amalgam, by means of hydrogen gas, and is a yellow metal of 2·4 sp. gr., but of no value thus far in the arts. Iridium is still chiefly confined to zinc blende, where it occurs in minute quantities. A new and neat way of roasting the blende for the purpose of obtaining this metal is suggested. The pulverized ore is mixed with burnt gypsum, and formed into cakes, which are perforated, and easily roasted by placing them upon any open fire. By subsequently treating the cakes with hydrochloric or sulphuric acids, and boiling in an excess of metallic zinc, all of the iridium will be precipitated as a spongy mass, capable of being fused and reduced ready for use.

The subject of iron in all of its relations occupies seventy-five closely printed pages. A good deal of the matter has been anticipated by us during the year, but for convenience of reference it is a pity that the whole chapter as it stands could not be translated and printed in separate form. The principal points are methods for determining the amount of carbon in iron, also phosphorus, silicium, manganese, and other impurities; then follow important analyses of ores and slags.

Under the caption of "The Manufacture of Iron," we have a sketch of all the latest methods, from which it would be difficult to prepare an abstract. In reference to silver, the author gives a history of the desilverization of lead by means of zinc, which is now regarded as the best process in use The most careful comparative tests have been made, in which preference is given to this method over Pattinson's, so long employed. A full description, with cuts, is given of Stetefeldt's furnace, now so popular in the West. Miller's chlorine process for refining gold, which we described some time since, is spoken of in high terms of commendation, and all the new things about gold and silver are mentioned in detail. Copper and its alloys, galvano-plastic, zinc, lead, nickel, cobalt, platinum, manganese, bismuth, tin, and mercury, have their proper places in the literature of the metals. Under chemical manufactures, sulphur and sulphuric acid naturally occupy the chief attention. The recovery of sulphur from soda waste, by Mond's process, now appears to be an accomplished fact, and it is difficult to overestimate the mercantile value of the improvement. Another matter of importance is the increased attention now bestowed upon the manufacture and uses of the bisulphide of carbon. This valuable product is largely employed in Europe in the extraction of oils, and has other uses which ought to receive more attention in this country. Soda ash, chlorine, hydrochloric acid, bromine, iodine, nitric acid, and phosphorus are heavy articles of manufacture in Europe, and ought to be more firmly established in the United States. Whatever may be the right or wrong of protection, as the advocates of this doctrine have had their own way for many years, and these industries are not yet established, how would it do for them to step aside and give the other side a chance? There would appear to be no valid reason why these manufactures should not flourish in the United States, and the want of them is felt in every branch of trade.

Wagner affords us much important information in reference to the production of potash from sugar residues, and from the deposits of the Stassfurt mines; he also gives a sketch of the history and progress of the various explosive compounds recently introduced. Baryta salts, so much used in France and Belgium, are fully described, and it seems a pity that the information should not be more widely disseminated. In the department of organic chemistry, such products as are of use in the arts are mentioned in detail, and we are surprised to see how many of them there are, and how little is properly known of them.

The improvements in the manufacture of glass, porcelain, and cements have been considerable during the last few years, and Wagner gives us a fair review of them. Under food, fuel, light, textile fabrics, and dyes we have much important matter.

It is impossible in one short notice to refer to half the new matter contained in a book of this character, and if the authors of some of our school books on technology would carefully peruse the sixteen volumes of Wagner's reports, they would see how wonderfully behind the age they are in their compilations. For that matter, if they have not access to the German, a perusal of the columns of the SCIENTIFIC AMERICAN, would be the next best thing to enable them to correct many errors.

THE LATE PROFESSOR PAYEN.

M. Pierre Thomas gives a sketch in *Les Mondes* of his uncle, Professor Payen, which discloses a life of such extraordinary industry and usefulness that we cannot do better than translate it for the benefit of our readers.

Payen's first great work was to fix the rational application of manures, in 1824. He gave the theory of the decoloration of liquids by means of animal black, and proposed the employment of the residue for agricultural purposes. In 1830, he established the principle, now universally accepted, of computing the nutritive value of composts according to their contents of nitrogen; he studied thoroughly the exact structure, mode of formation and transformation of starch, and this conducted him to the determination of cellulose in the vegetable tissue, to the remarkable indications of the secretion of mineral substances in the organs of vegetables, to the manufacture of dextrine by the kiln, and also to the discovery of the principle of diastase, which plays such an important part in the process of fermentation.

These conspicuous discoveries afford but a faint idea of the enormous amount of work accomplished by Payen. It would be difficult to conceive of a man more indefatigable, more anxious to accomplish something. There was not a scientific society of which he was not a member; not a meeting at which he was not present; not a commission of which he did not form a part, and usually as the reporting secretary. The works of Payen, so far from being confined to his personal publications, are found spread out in the transactions and proceedings of all learned societies. And yet to form an idea of his prodigious activity, it is well to recall that he was to be encountered on all occasions of ceremony, taking a part in public and private entertainments, and in general fulfilling his duty as a member of society to the minutest particular.

One fact, often related of him, shows to what an extremity he pushed his economy of time. His carriage was made into a perfect workshop; he wrote in it, he had in it reagents and a few simple pieces of apparatus, and he used it as a dressing room to avoid the necessity of the loss of time required to return home and change his toilet for a reception. Payen taught industrial chemistry at the *Ecole Centrale* for forty-one years, and at the *Conservatoire* for thirty-two years, without losing a single lecture. Last year, when attacked by a severe illness so that he could take no nourishment for several days, he could not be persuaded to intermit his lectures, but had to be carried fainting from the rostrum. The disease to which he finally succumbed, and which carried him suddenly away, was apoplexy. It will be difficult to replace Payen. He was the only professor who united, to a grand scientific knowledge, complete practical information of the subjects taught, derived from thirty years of personal technical work.

PSYCHIC FORCE.

Mr. Coleman Sellers, of Philadelphia, Pa., well known as an able mechanical engineer, and among his intimate friends as an amateur prestidigitator of unusual skill, has, in a brief article in the *Franklin Journal*, thrown considerable doubt over the genuineness of those manifestations of "Psychic force" which have lately been announced by Dr. Crookes, supported by the well known astronomer, Mr. Huggins, and others.

Mr. Sellers first draws attention to the fact that scientific men have not as a rule "been unwilling to investigate" *facts* (?) of the class under discussion, but have only insisted that these *facts* should be produced under conditions excluding facilities for sleight of hand and other related deceptions.

Such requirements, however, have not been complied with generally, nor in the case related by Dr. Crookes, therefore Mr. Sellers argues that the right sort of "expert" to investigate such phenomena would be one skilled in legerdemain and the intricacies of complex mechanism.

He further alludes to the floating accordion, and suggests a striking parallel in the case of Hermann's floating wand, and in reference to the music from the same instruments, calls attention to a whole class of performances related to ventriloquism, which serve to explain the means by which the recorded effect was probably produced.

The writer of this has seen Mr. Sellers among a company friends perform a feat, which, with a change of instruments, would be identical with that described by Dr. Crookes, and which, without the aid of an ear trumpet, which was not applied by our English friends, would defy detection on the part of the uninitiated.

Robinson's Breech-loading Rifle.

In our description of this invention, published on the first page of No. 9, current volume, an error occurred in describing the method of filling the magazine with cartridges. It is not necessary to take out the screw, Q, as therein stated. This screw does not pass through a hole in the outer plate, but simply fits into a slot. It is, therefore only necessary to turn the plate down into the position shown in dotted outline. No screw has to be taken out, as erroneously stated. Also in the seventh paragraph, the link, O, is referred to Fig. 1. It should be Fig. 4.

A CORRECTION.—In the article in our issue of the 26th of August, in commenting upon the testimony of Mr. McMurray, we styled him the Inspector of the New York and Hartford Steam Boiler Assurance Association, this being the title applied to him in the reports of his evidence as printed in the city papers. We now understand there is no such organization as the one named, and that the gentleman in question is the chief Inspector of the New York Branch of the Hartford Steam Boiler Inspection and Insurance Company.

THE SUEZ CANAL.—General C. W. Darling, of New York city, has received a letter written by Baron de Lesseps, President of the Suez Canal Company, stating that the report of the canal being rendered comparatively useless by the filling up with sand, is incorrect. M. de Lesseps says: "The deposits of sand brought by the wind are insignificant, and the sides of the basin are so solid that the most exposed portions of the work, after eighteen months' use, present scarcely a perceptible variation."

CANNOT AFFORD TO STOP.—An advertiser in answer to our enquiry if he wished his advertisement continued, says:—"Every week we sell machinery, the profits on which will pay for our advertisement for six months, that we should not sell but for your paper; so you see we cannot afford to stop, so please keep on as heretofore."

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[Special Correspondence of the Scientific American.]

INTERESTING EXTENSION CASES.

Washington, D. C., August 26, 1871.

The following extensions have recently been granted: James A. Watrous, for mode of suspending eave troughs; George C. Dolph, for a mowing machine; Charles Monson, for an extension gas tube; John Toulmin, for vibrating shears, the jaws being adjustable to maintain a good cutting contact of the blades; Israel Dodenhoff (deceased), a raking mechanism for harvesters, consisting in the construction and combination of the rake with the platform, guides, and gate. The rake travels in a continuous horizontal path. This is one of those cases in which the patentee and his heirs have been unable, for lack of means, to prosecute the invention, and properly bring it before the public. Charles H. Sayre, for cultivator, in which a horse hoe is combined with a double mold board plow, the plows and mold board being made adjustable. Philip W. Mackenzie, cupola furnace for melting iron; the blast is in a continuous sheet; invention very valuable, but no opposition to the extension. Two applications have been refused. Gideon B. Massey, measuring depth of water in slips. This invention consists in an arrangement of an alarm bell and trip, operated by a spring barrel, upon which is wound a cord suspending a heavy float on the water in the hold, so as to indicate on a dial the depth of water, and also to give audible notice when it reaches certain hights.

In view of the patent to Nelson Edwards, March 5, 1850, and the rejected application of W. H. Horton, filed December 1851, the examiner reported unfavorably to the extension, holding that the original patent should not have been granted.

A novel case, and it is to be hoped an exceptional one, has been before the Commissioner this month, in which an extension was both granted and refused, namely, the patent of Timothy Taft, for a metal cutting shears. The upper edge of the movable blade constitutes the inclined plane on which the wheel travels, while the wheel itself is compelled to follow a horizontal direction. The bearing surfaces of the two wheels and two planes are plain, and to prevent slipping, cogged plates are attached which interlock.

Upon the hearing of this case, reference to the records of the office showed that the patentee had made an assignment of all his interest, including the extension, if granted. Under the law the office is not allowed to grant extensions for the sole benefit of assignees, and the Commissioner so ordered; whereupon the attorney in charge of the case, stated that the assignment had been given as a temporary security for money loaned, and that the patentee having cancelled that obligation, the patent had been that day *re*-assigned to him, but the re-assignment papers had not yet been recorded.

Upon hearing this explanation, and being assured that the transaction was a *bonâ fide* one, the Commissioner, after the re-assignment was duly entered in the record room, granted the extension. As soon as the decision was rendered, the attorney filed a third assignment of same date with the re-assignment, transferring all right and interest in the patent back again to the same assignee, one Lucius W. Bond, thereby showing that the re-conveyance to Taft was a mere fiction to deceive the Commissioner. The records further show that the patentee, a few days later, assigned his interest in full to one Elizabeth H. Taft. It is not difficult for those who know Mr. Leggett, to believe that on learning the above facts, only an exceedingly curtailed period of time intervened before his first decision was reversed, and the extension refused. Tricks like this are not likely to thrive under Commissioner Leggett's administration.

In a previous letter some figures were given showing the number of patents issued to applicants of each State, based on an examination of the issues of one month only—not two months, as was erroneously stated. [Your Illinois correspondent, who took exception to the number for that State, will please take note of the above correction.]

I now send you the list of issues by States during the first six months of the present year.

New York, 1,282; Pennsylvania, 688; Massachusetts, 613; Illinois, 438; Ohio, 404; Connecticut, 306; New Jersey, 231; Indiana, 193; Michigan, 174; Maryland, 127; California, 121; Missouri, 119; Wisconsin, 112; Iowa, 93; Rhode Island, 84; District of Columbia, 62; Kentucky, 60; Virginia, 52; Georgia, 42; Louisiana, 39; Tennessee, 35; North Carolina, 30; Mississippi, 24; Delaware, 23; Texas, 21; Minnesota, 20; Kansas, 20; West Virginia, 16; South Carolina, 13; Alabama, 13; Oregon, 10; Nevada, 8; Nebraska, 7; Arkansas, 6; Florida, 5.

AMERICAN INSTITUTE FAIR.

A visit on the 30th of August to the immense building known as the Empire Skating Rink, in which the coming Fair of the American Institute is to be held, opening on the 7th of September, revealed the fact that in all probability the delays attending the former expositions of this Association are to be repeated this year. Scarcely anything to be shown was on the ground, although the building seemed thoroughly prepared for the reception of everything to be exhibited. The steam boilers were in position, and the large steam engine intended to drive the machinery was nearly set up. The line shafting is also all mounted, and, in short, the managers seem to have performed all the necessary preliminary work. The delay, then, if it takes place, will be on account of the dilatoriness of the exhibitors. We trust, however, that the managers will refrain from opening the Fair until all the arrangements are perfected, and not lay themselves open to the charge made in previous years that they advertised their show, and took money for admission before scarcely anything was ready for exhibition. The building has been enlarged, and the prospects are that the Fair will exceed in interest any previous one.

Inundation in Hungary.

Our latest European advices bring accounts of a great calamity in the valley of the Temes. This river rises in the Carpathian mountains, and after a course of 180 miles, flows into the Danube at a point six miles from Belgrade. To save the adjacent lands from flooding, dams were many years ago built; but these were allowed to get out of repair, although the attention of the authorities was called, by the inhabitants of Southern Hungary, to the impending danger. The Temes and its three tributaries, the Bisztra, the Bogovitz, and the Berzava have been unusually full for some time past, and at last the dams have given way. Whole tracts of country have been overflown, and crops of enormous value utterly ruined. To add to the desolation, severe hailstorms have visited the district, destroying vineyards and orchards, wheat and tobacco fields. The government has, in reversal of the policy of conciliation pursued for some time past, vigorously collected the taxes, these calamities notwithstanding; and the population of a large agricultural district is thus deprived of its trade and industry, and the inhabitants are in great distress.

Improved Awl.

Mr. Samuel Babbitt, of Brazil, Indiana, has recently patented an awl constructed with an eye for withdrawing the thread or bristle from the inside of a boot or shoe in the process of sewing. The eye of this awl is made so that it can be opened or closed by a slide which, coming in contact with the leather when the awl is thrust in, automatically opens the eye, the slide being actuated by a spring to close the eye when the awl is withdrawn. The thread, entering the open eye, is held therein by the closing of the slide, and is thus withdrawn.

THE NEW JERSEY STATE AGRICULTURAL SOCIETY announces its thirteenth fair, to be held at Waverly station, near Newark, on September 19, 20, 21 and 22, 1871. Premiums are offered to meritorious exhibits in every branch of agricultural and mechanical industry, as well as in manufactured articles, ornamental as well as useful, and in the fine arts. Steam power and main shafting are provided for the accomodation of exhibitors of machinery, who will, however, have to provide counter shafting, where required, at their own expense. A feature, novel and especially commendable, in the programme, is the offering a gold medal for the best specimen of apprentice's labor in any branch of the mechanical arts. A competition of more than usual interest will be a trial between an Aveling and Porter steam road engine, imported from England, and an engine of the Scotch design, (Thompson's patent), built by the Grant locomotive firm at Paterson. A gold medal is offered for the best steam fire engine. The general superintendent of the arrangements is Mr. E. G. Brown; and the secretary, Mr. E. M. Force, of Newark.

MR. HEYSINGER, of Philadelphia, writes to suggest that the invention of Colonel Clerk, described and illustrated on page 114, current volume, would be much simpler, as well as more effective, if the water resistance were accommodated to the varying strain by using a solid piston, and grooving the inside of the cylinder longitudinally with several grooves following a curve.

Inventions Patented in England by Americans.

August 8 to August 14, inclusive.

COVERING WIRE, ETC.—A. P. Brown, New York city.
DRESSING MILLSTONES, ETC.—J. W. Fry, Nashville, Tenn.
DRESS PROTECTOR.—F. Wittram, New York city.
HOLDER FOR UMBRELLA.—A. Clarke, Chicago, Ill.
SAND PAPERING MACHINE.—J. Barker, Chicago, Ill.
SCREW PROPELLER.—H. Zahn, San Francisco, Cal.
SEED PLANTER.—W. L. Seward, Washington, D. C.
UMBRELLA.—J. Shepard, New Britain, Conn.

Foreign Patents.

The population of Great Britain is 31,000,000; of France, 37,000,000 Belgium, 5,000,000; Austria, 36,000,000; Prussia, 40,000,000; and Russia, 70,000,000. Patents may be secured by American citizens in all of these countries. Now is the time, while business is dull at home, to take advantage of these immense foreign fields. Mechanical improvements of all kinds are always in demand in Europe. There will never be a better time than the present to take patents abroad. We have reliable business connections with the principal capitals of Europe. A large share of all the patents secured in foreign countries by Americans are obtained through our Agency. Address MUNN & Co., 37 Park Row, New York. Circulars, with full information on foreign patents, furnished free.

Examples for the Ladies.

Mr. Gilbert Brown, of Williamsburg, N.Y., brought a $55 Wheeler & Wilson Machine in 1856, (price then $100;) borrowed most of the money to pay for it; has supported his family with it; bought and paid for a house and lot paid taxes, church dues, etc., besides doing his family sewing. During the war he averaged daily 8 infantry frock coats, or 10 cavalry jackets, or 8 military overcoats. Since then he has earned at custom work from $3 to $5 per day of 9 hours, and would not now sell his machine for the price he paid for it.

Says a late issue of the Philadelphia *City Item:* "Ingenuity has been taxed to find the surest and most direct means of reaching the public, and the business man who would advertise a specialty, and get the greatest good out of the greatest number in the shortest space of time, is compelled to go to Geo. P. Rowell & Co., of New York, for advice. Why to this house? Because it is the head and front of the advertising business. It is prompt, methodical and clear in its transactions, and possesses the confidence of all the houses which advertise most."

Rose Cold and Hay Fever disappear by the use of Jonas Whitcomb's Asthma Remedy.

[By Telegraph.]

American Steam Safe Co., Cole & Lambert, Managers, No. 300 Broadway, New York City: Our hotel and 30 buildings were destroyed by fire on the 23d inst. The steam safe made by you has just been opened, *after remaining in the burning ruins sixty hours*, and books and papers remarkably preserved, not being even discolored, W. H. WELCH & SON,
Ithaca, N.Y., August 26, 1871. Late Proprietors Ithaca Hotel.

Safety of Herring's Safe.

AMBOY, Ill., Aug. 26.—The safe of J. Little, banker, whose bank shared in the conflagration, last night, has been got out of the ruins, *and its valuable contents are uninjured.* It is one of Herring's safes.—*Chicago Journal.*

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per Line will be charged.

The paper that meets the eye of manufacturers throughout the United States—Boston Bulletin, $4 00 a year. Advertisements 17c. a line.

Refined Paraffine Wax, any kind and quantity. C. C. Beggs & Co., Pittsburgh, Pa.

The Eccentric Elliptic Geared Power Presses save power, time labor, and save Punches and Dies. For Circulars, address Ivens & Brooke Trenton, N. J.

Rare Chance—A very profitable manufacturing business for sale—Water Power, Mills, &c., 10 miles from N.Y. city. Price $5,000. Address H. Wilber, Newark, N. J.

For sale, at a bargain, the Machinery and Stock, for Hoop Skirt Making. Also, a valuable patent for hoop skirts. Will exchange for other property. R. M. Mansur, Augusta, Maine.

A Patent Lock Business for sale, at a bargain. Machinery Tools, Patterns, complete. Apply to C. S. Fordham, 545 W. 21 st., N.Y.

A foreign correspondent asks for description and prices of Shingle Sawing Machines. Send circulars and replies to this office.

Wanted—A party with capital, to finish a machine for whitening and buffing leather. Patents secured, machine nearly done—excellent results have been obtained. Wm. A. Perkins, 20 Peabody st., Salem, Mass.

d'Heureuse's Patent Air Treatment in the quick, cheap, and perfect manufacture of wine, cider, spirits, sugar, oils, etc. Rights for sale. For particulars, apply to R. d'Heureuse, P.O. Box 6,844 New York.

No end to demand for reversible sash illustrated July 22, M'f'rs Sash, Builders' Hardware, etc., secure your territory *now* at low rates. Wm. P. Nelson, 618 N. Main street, St. Louis, Mo.

Vinegar—how made—of Cider, Wine, or Sorgo, in 10 hours. F. Sage, Cromwell, Conn.

Copper and Brass Seamless Tubes (from 3-8 to 5 in. outside diameter). Merchant & Co., 507 Market st., Philadelphia.

Patent English Roofing Felt, ready coat, thick, durable, and cheap. Merchant & Co., 507 Market street, Philadelphia.

See advertisement of Wilkinson's Combination Pocket Tool.

Send to E. & A. Betts, Wilmington, Del., for list of nice Machinists' Tools, on hand, and making.

For best Lubricating Oil, Chard & Howe, 134 Maiden Lane, N.Y

To Cotton Pressers, Storage Men, and Freighters.—35-horse Engine and Boiler, with two Hydraulic Cotton Presses, each capable of pressing 35 bales an hour. Machinery first class. Price extremely low. Wm. D. Andrews & Bro., 414 Water st. New York.

L. & J. W. Feuchtwanger, Chemists, 55 Cedar st., New York, manufacturers of Silicates of Soda and Potash, and Soluble Glass.

Send your address to Howard & Co., No. 865 Broadway, New York, and by return mail you will receive their Descriptive Price List of Waltham Watches. All prices reduced since February 1st.

Self-testing Steam Gauge.—The accuracy of this gauge can be tested without removing it from its connection with the boiler. Send circular. E. H. Ashcroft, Boston, Mass.

Ashcroft's Low Water Detector. Thousands in use. Price, $15. Can be applied for less than $1. Send for Circular. E. H. Ashcroft, Boston, Mass.

Lord's Boiler Powder is only 15 cts. per pound by the bbl., and guaranteed to remove any scale that forms in steam boilers. Our Circular with terms and references, will satisfy all. Geo. W. Lord, 107 W. Girard ave., Philadelphia, Pa.

Brown's Coalyard Quarry & Contractors' Apparatus for hoisting and conveying material by iron cable. W.D. Andrews & Bro, 414 Water st., N.Y.

Presses, Dies, and Tinners' Tools. Conor & Mays, late Mays & Bliss, 4 to 8 Water st., opposite Fulton Ferry, Brooklyn, N.Y.

Over 1,000 Tanners, Paper-makers, Contractors, &c., use the Pumps of Heald, Sisco & Co. See advertisement.

For Solid Wrought-iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Mining, Wrecking, Pumping, Drainage, or Irrigating Machinery, for sale or rent. See advertisement, Andrew's Patent, inside page.

Bliss & Williams, successors to Mays & Bliss, 118 to 122 Plymouth st., Brooklyn, manufacture Presses and Dies. Send for Catalogue.

Makers of 4 in. light Cast Iron Pipe, address E. Whiteley, 61 Charlestown Street, Boston.

Improved Mode of Graining Wood with Metallic Plates, patent July 5th, 1870, by J. J. Callow, Cleveland, O. Sample plate sent for $3.

Superior Belting—The best Philadelphia Oak Tanned Leather Belting is manufactured by C. W. Arny, 301 Cherry Street, Philadelphia.

Improved Foot Lathes, Hand Planers, etc. Many a reader of this paper has one of them. Selling in all parts of the country, Canada Europe, etc. Catalogue free. N. H. Baldwin, Laconia, N. H.

Bailey's Star Hydrant, best and cheapest in the world. All plumbers send for a circular to G. C. Bailey & Co., Pittsburgh, Pa.

Wanted—To invest $500 to $5,000 in a good paying Manufacturing or Mercantile Business. Address Box 574, Pittsburgh, Pa.

Copper and Brass Seamless Tubes (from 3-8 to 5 in. outside diameter. Merchant & Co., 507 Market st., Philadelphia.

Line, Shafting, Pulleys, and Hangers.
First class. Send for circulars and price lists. Greenleaf Machine Works Indianapolis, Ind.

Peck's Patent Drop Press. For circulars address the sole manufacturers. Milo, Peck & Co., New Haven, Ct.

Diamonds and Carbon turned and shaped for Philosophical and Mechanical purposes, also Glazier's Diamonds, manufactured and reset by J. Dickinson, 64 Nassau st., New York.

To Ascertain where there will be a demand for new machinery or manufacturers' supplies read Boston Commercial Bulletin's Manufacturing News of the United States. Terms $4 00 a year.

For Sale—The whole or one half interest in Shaw's Patent Feed Water Heater, Filter, and Lime Extractor for Steam Boilers, now being manufactured by David E. Shaw, patentee, Chatsworth, Ill. Send for circular. Investigation solicited.

Patent for sale, or Partner wanted with capital to introduce the same. Please address Philip Marquard, 468 Swan st., Buffalo, N. Y.

Wanted, a good salesman to take charge of a new branch machinery store we are about opening—one who is familiar with Woodworking Machinery, and can furnish good references. Address J. A. Fay & Co., Cincinnati, Ohio.

$4.00. Stephens' Patent Combination Rule, Level, Square, Plumb, Bevel, Slope Level, etc. See advertisement in another column.

Manufacturers of Corset and Hoop Skirt Steel Springs address D. M. Crawford, Sterling, Ill.

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Answers to Correspondents.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at 1·00 a line, under the head of "Business and Personal."

ALL reference to back numbers must be by volume and page.

TEMPERING MILL PICKS.—F. A. K., in issue of July 15th, asks for a recipe for tempering mill picks. I find the following an excellent method: After working the steel carefully, prepare a bath of lead heated to the boiling point, which will be indicated by a slight agitation of the surface. In it place the end of the pick to the depth of 1½ inches, until heated to the temperature of the lead, then plunge immediately in clear cold water. The temper will be just right, if the bath is at the temperature required. The principal requisites in making mill picks are: First, get good steel—"Butcher" or "Jessup" I have found good. Second, work it at a low heat; most blacksmiths injure steel by overheating. Third, heat for tempering without direct exposure to the fire. The lead bath acts merely as protection against the heat which is almost always too great to temper well.—R. B., of Tenn.

SCALING STEEL.—L. G. can remove the scale from steel articles by pickling in water with a little sulphuric acid in it, and when the scale is loosened, brushing with sand and a stiff brush.—D. G. P., of Ill.

SOFTENING GUMS.—The trouble with W. W. G.'s gums probably is a deposit of salivary calculus upon his teeth, under the free edge of the gum, which can only be removed by the scaler of a dentist.—D. G. P., of Ill.

PARIS GREEN ON POTATOES.—In your issue of August 19th, C. E. McR. asks if Paris green put on potato plants will poison the tubers so that people would be poisoned by eating them. I think not, and yet cannot consider it entirely safe to use it. Pure Paris green, or Scheele's green, is arsenite of copper. It is insoluble in water; hence, when put upon the soil, it remains in it like so much sand. W. W. Daniels, of the University of Wisconsin, writing on this subject, says, "There is no evidence to show that plants ever take this substance into their circulation, and the laws of vegetable physiology would lead us to believe that if they do so at all it must be in the smallest quantities." Still, to use it is to put an active poison into the soil, which *may* never do any harm. Of course, it is not likely to do any harm from being on the outside of the tubers, for they are usually pared, or at least well washed, before being cooked. But time, only, will show the result of using it, for it will remain in the ground unless removed by those "slow natural solvents which are constantly at work decomposing the mineral ingredients of the soil."—L. Q. B., of Ohio.

BATTERY.—"Neutral" asks some questions which I will endeavor to answer. First: A carbon plate is preferable to a copper one in a theoretical sense, since the battery resistance is less, that is, the intensity is greater with carbon than with copper; but to T. G. B., wishing to construct his own battery, I recommended copper and zinc, because I believe that, in most places, copper plates are more readily obtained than good carbon ones; besides there are practical objections to carbon plates which are difficult to overcome. Carbon is permeable by liquids; and the fluids of the battery, being drawn up by capillary attraction, finally reach the metallic caps and corrode them, thus offering a great, if not an insurmountable barrier to the current. The only means of preventing this is to thoroughly cleanse the plates and their metallic caps after use, or to make the carbons reach so far above the cells that capillary attraction will not raise the fluids to their tops. The first of these methods is troublesome the second inconvenient, and it thus usually happens that carbon plates are dearer in the long run than platinum ones. Second: I know nothing about "electropoin," having never even seen it; nor do I understand why people should buy "battery fluids" when they can get all the water, acid, and salts necessary. Third: The bichromate solution gives off no fumes when in action, unless too much sulphuric acid be added, when a little hydrogen is eliminated. It may consequently be used in a parlor with impunity.—NEMO, of Canada.

CONE PULLEYS.—Although the subject of what are termed "Cone Pulleys" has been somewhat ventilated in the SCIENTIFIC AMERICAN, and various correspondents have forwarded, from time to time answers to some proposed questions, it does not appear from the communication of A. W. G. that the subject is yet clear in his mind. If A. W. G. has tried the rules given by previous correspondents and found them incorrect, or in some cases worthless, I do not wonder at it. An answer to his question, even if he had given all the data, requires the solution of a transcendental equation, and cannot possibly be solved by diagrams, while, as it now stands, it is mathematically indeterminate. The truth is, that the theory of cone pulleys is a complicated and difficult one, one element in the solution of which is the distance between the axes of the pulleys; and it is only when this distance is very great in comparison with the diameter of the larger pulley, or when the two pulleys are of nearly the same size, that the rule commonly given will apply. If belts were made of some inextensible substance, the difficulties of adjustment would require more accurate rules, but fortunately leather straps readily accommodate themselves to slight errors of construction, although not running in such cases with "equal tension."—NEMO, of Canada.

TABLE CUTLERY.—It is possible that the carving knives which trouble R. S. S. H., with their relenting temper were not heated enough to harden them, except on the edge; or that they were dipped when hot, so that only the edge was suddenly cooled. If the blades were cooled between cold plates, the edge and back might be hard and the middle of the blade softer. Then, when the edge wore away, the temper would gradually fail. If the knives, while in his possession, were sharpened on an emery wheel or dry grindstone, the temper might have been extracted by friction heating; and, furthermore, as "constant dropping wears away stone," so a frequent heating to a temperature of 212° may lower the temper of steel by relaxing the rigid cohesion of its particles. In any case here mentioned, the quality of the steel remains uninjured, and its temper can be restored by rehardening. Working hot steel has been my business for 22 years, and I am surprised at the assertions in the paper read at the London Association of Foremen Engineers, entitled "What is Steel?" I take exception to many of its statements. Watching the effects of circumstances upon the temper of steel has been my practice. It is singular how slight a thing may change its nature. R. S. S. H. may be laughed at for his scalding water theory, but he is not much out of the way.—B. F. S., of N. Y.

BELLOWS.—Let L. V. H. take a common wash tub or half barrel; put a keg inside it, with a hole one inch in diameter. Adjust a small bellows in connection with the keg, to be worked by a treadle. A rubber hose will do to convey the air from the keg to the flame. Fasten the keg to the bottom of the tub, and two thirds fill the latter with water. When the bellows is worked, the air cannot pass out of the mouth of the tube as fast as it is forced into the keg, so the air forces the water out of the hole; and the weight of the water forces a steady pressure of air through the tube.—T. E. L., of Ky.

TABLE CUTLERY.—I will answer that scalding water is of far too low a degree of heat to have any effect on the temper, but hot grease (which table cutlery is likely to come in contact with in the hands of servants), might, if it was brought almost to a flaming point. However, all table cutlery is hardened in oil, and the degree of heat that will give the best result on the thinner part of the blade will not harden the back at all. Hardly any knife with anything like a thick back is hardened for more than one third of its width.—R. F., of Ill.

BELTS.—S. G. D., in pressing one end of his "straight faced tightener" to the belt harder than the other, is only illustrating the principle of the "crowning," or "high faced pulley."—E. B. T., of Pa.

WATER FOR AQUARIA.—G. W. G. can use either well or cistern water, for neither will injure gold or native fishes. I have kept mine, first in one, and then transferred them to the other, in order to see if it would injure them, but I could not see any change in them. He need only change the water when it becomes green. Let him have a small cup handy, and when he passes his aquarium take up a cup full and pour it back into the aquarium from a hight of eighteen inches—that will help to keep the water pure.—T. E. L., of Ky.

SPONTANEOUS IGNITION.—I suppose it is a well known fact, that a handful of cotton waste, slightly saturated with boiled linseed oil, will spontaneously take fire within two hours. Will some chemist please explain?—S. S. B., of Vt.

Queries.

[We present herewith a series of inquiries embracing a variety of topics of greater or less general interest. The questions are simple, it is true, but we prefer to elicit practical answers from our readers.]

1.—EXTRACTING FIBRIN FROM BLOOD.—I would ask the many readers of the SCIENTIFIC AMERICAN, how to deprive blood of its fibrin?—S. G. D.

2.—LOCUST SEED.—I wish to plant a quantity of white locust seed, to grow posts for fencing purposes, and have been informed that not more than one seed in every pint will sprout, if sowed ordinarily. Will some of your numerous readers inform me through what process, if any, the seed can be taken to make them propagate? I have been informed by one person that they will require roasting. Is it so? If so, how much? Should they be planted in fall, winter, or spring?—V. A. J.

3.—POLISHING SHELLS.—I wish to know how to remove the dark crust from ornamental shells, and how to polish the same.—E. A. S. B.

4.—KILLING FLIES.—Can any of your readers tell me of anything which, if burnt in a close room, will kill the flies therein? I have tried brimstone with no effect except to increase the animation of the insects.—J. G. D.

5.—CONCAVE REFLECTORS.—Permit me, through your "Query" columns, to ask the following questions: What is the cheapest way to make concave reflectors, about sixteen or eighteen inches in diameter, which will condense the rays of the sun at a point about six feet from the reflector, that is, of six feet focus? It is not necessary that they should be perfectly true. How are the glass lamp reflectors made, the kind that are silvered like a looking glass?—R.

6.—COMPRESSED AIR ENGINE.—I see it noticed in some papers that there is a slight modification of the steam engine necessary in order to run the same by compressed air. Please state the said modification. I wish to construct and use an engine to run by compressed air.—A. R. C.

7.—RENOVATING CARPETS.—What kind of machinery is used for renovating carpets in large establishments in the city?—O. G. M.

8.—COLORING GOLD.—Can some of your readers give me the *modus operandi* by which gold is colored so as to make the so called "Etruscan" jewelry?—R. L. K.

9.—RESTORING GRINDSTONE.—I have a large, fine grit grindstone, which has become hard and glazed by exposure. Can any of your readers inform me how it can be restored?—J. E. G.

10.—ANASTATIC PROCESS.—Will some of the readers of the SCIENTIFIC AMERICAN tell me how to prepare a zinc plate for anastatic printing, and how to make a transfer ink which can be used with a pen?—E. P. W.

11.—APPLYING SAND TO SURFACE OF IRON.—How can I make sand (the same as used in the manufacture of the best flint sand paper) adhere to the planed surface of wrought or cast iron? I wish to use it for sand papering wood. And where can I obtain the sand?—M. N. S.

12.—FORMULA FOR SAFETY VALVE.—Will any of the readers of the SCIENTIFIC AMERICAN be kind enough to instruct me how to calculate the effective weight of a safety valve lever?—A.

13.—BRONZING PLASTER CASTS.—I have two large plaster busts which I wish to bronze in imitation of good French bronze. Will some one give me the method in detail?—J. W. H.

Declined.

Communications upon the following subjects have been received and examined by the Editor, but their publication is respectfully declined:

BEDFORDIAN SYSTEM OF ASTRONOMY.— ——.
CAUSES OF DISEASE.—Z. C. Mc E.
COLORADO AND NEVADA ORES.—C. W.
GRAVITY AND HEAT.—M. R. L.
OZONE AND ANTOZONE.—C. H. Du P.
PERPETUAL MOTION.—F. J. A.
PROPULSION ON CANALS.—E. O. P.
PSYCHIC FORCE.—J. E. H.—G. W. R.
SEASONING LUMBER BY DRY STEAM.—H. G. B.
THE AEROLITE THEORY.—C. M
VAIN EGOTISTS.—R
ANSWERS TO CORRESPONDENTS.—A. D.—B. T.—J. C. C.
QUERIES.—A. D.—A. L. W. Jr.—W. J. H.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

DENTAL DRILL.—Alexander Hartman, of Murfreesborough, Tennessee.—A rattan is applied in a dental drill as the flexible rod or connection by which the burr-holding mandrel is revolved. A double threaded nut is applied to the holder and the rattan within a tube to connect the two parts together. The invention is used with some rotating device similar to the fiddle drill movement, or otherwise as may be expedient.

STREET CARRIAGE.—Mr. George S. McHenry, of Kansas city, Missouri, has invented an improvement in the construction of street carriages to adapt them more especially for running upon Nicolson and other smooth pavements, and which will make the carriage as convenient as a street car, while requiring no track. The wheels are made large so as to roll easily and smoothly. The axles are bent twice at right angles near each wheel, so as to bring the horizontal middle part of the axle close to the ground. The body of the carriage is connected with the axles by bolts or other devices to keep it in place. Springs are interposed between the body and the axles, having sufficient strength and elasticity to support the carriage body and cause it to ride easy. The springs are made of steel or other suitable material, and of any suitable form. The lower part of the side walls of the body of the carriage is made double for a sufficient hight to form recesses to receive the wheels, so that the latter may be entirely out of the way and almost entirely out of sight, and, at the same time, not lessen the carrying capacity of the carriage.

BALANCING PISTON.—Leonard Finley, of St. Louis, Mo.—This invention relating to steam or air pistons working horizontally; it consists in providing one or more cavities in the face of the piston at the under side, and admitting steam thereto to act between the piston and the cylinder to counteract the weight. The arrangement also facilitates lubrication.

PUMP.—Everard S. Crowell, of Augusta, Maine.—This is an improvement in the class of force pumps provided with two sets of inlet and outlet valves, and two pistons simultaneously reciprocated in the same cylinder and in opposite directions. It consists in the arrangement, with receiving and eduction chambers of peculiar construction, of three induction and three eduction valves, whereby, it is claimed, water may be constantly drawn into the cylinder and forced out of the same with more uniformity and steadiness, as well as force of flow, than in allied inventions.

STEAM BOILER.—George Keen, of North McGregor, Iowa.—The object of this invention is to increase the steam generating surface of the ordinary flue boiler and to consume the smoke and gaseous products of combustion thereby economizing fuel. It consists in a series of short funnel shaped conducting tubes, which connect the furnace or fire box with a main flue or combustion chamber of the boiler, and in an adjustable damper at the front end of the said main flue, by means of which any required amount of atmospheric air may be admitted to mingle with gaseous products of combustion in the flue, thereby supplying an additional amount of oxygen to such gases and consuming them. It also consists in a general arrangement and combination of parts.

GANG PLOW.—John Blackwood, of Madison Township, Ohio.—This invention furnishes an improved gang plow, so constructed as to plow furrows of uniform width and depth, and which raises the furrow slice without pressing upon the bottom of said furrow, leaving the ground at the bottom of the furrow loose and porous. It consists in the construction and combination of various parts, as set forth in the specification of the inventor.

ATTACHING PLOWS TO TRACTION ENGINES.—William H. H. Heydrick, of Chestnut Hills, Pa.—The plows are arranged diagonally across the machine. The plow beams are connected with the beam of a triangular drawing frame by plates. These plates are provided with ribs on the under side which are perpendicular to the line of draft. Each plow beam is provided with a hinge plate, grooved so as to correspond with the ribs of the first named plates, and also with a slot. The hinge plates are clamped to the ribbed plates and to the beam by bolts and suitable screw nuts. These bolts are provided with rubber springs placed under the head of the bolt or under the nut. The object of this arrangement of the spring is to allow the hinge plates to escape when the resistance on the oblique walls of the ribs of each plate becomes excessive. When this resistance is greater than the resisting power of the springs in the lengthwise direction of the bolts, the said plates will escape. The tension of these springs may be regulated by screwing up the nuts.

MOLDING MACHINE.—This is the invention of John Demarest, of Mott Haven, New York. The mechanical details of the invention are of such a nature that they cannot be described here. The machine is especially designed to be useful in core casting, in molding pipes, etc. The claims cover the use of triangular gates arranged and operated in a specified manner, and for the purpose set forth, also combinations of various devices, but the most prominent and novel feature is the formation of the core shafts of large cores of an oval form, so as to leave the greater thickness of sand in the line of movement of the sections of the mold, thereby securing uniform compression of the sand when the mold is closed.

CARPET STRETCHER.—S. Eliott, of Sonora, Cal.—This consists of two bars, at the end of one of which is a box into which the other bar slides. One of the bars is provided with claws to seize upon the carpet. Within the box is a pulley block, cord and windlass. The cord passes from the windlass over the pulley and is then attached to the bar in such a way that winding up the cord thrusts the bar out. In use, the claws are made to engage the carpet; the other end of the device is placed against the opposite side of the room, and the windlass being turned, the carpet is stretched; the windlass being held by a ratchet and pawl while the stretched carpet is being tacked down.

DOVETAILING MACHINE.—John B. Ritchey, of Pomeroy, Ohio.—A revolving cutter is mounted in a vertically reciprocating frame, and a table whereon the work is to be presented to the machine, having the boards, to be dovetailed, clamped upon it, has to be moved along past the cutter the distance from center to center of the tenons or mortises, and held while the cutter moves up or down through the board when laid flatwise to do its work; and as the distances between centers vary in different work, it becomes necessary to employ adjustable spacing devices in connection with the table for the purpose. These consist in the adjustable blocks arranged in a slotted bar, and having the wedges between them, by which they are shifted closer together or further apart, as may be required by the work in hand, the said wedges being driven in or drawn back by a plate and adjusting screw, and the upper ends of the blocks engaging a spring pawl or holder, attached to the under side of the table, and springing down over the blocks, so that a projection on it, bearing against the blocks at one side, will regulate or gage the position of the table. In this example it is proposed to make use of the same instrumentalities, with the following modifications. The blocks are notched on one side, and fit the wedges in them to hold them down.

MEDICAL COMPOUND FOR KIDNEY DISEASES.—Robert Hawkins and Albert Addison Hill, of Beallsville, Pa.—This is a combination of vegetable remedies to form a remedy for gravel and stricture, and it is claimed is used with the best results in diseases of the kidneys, bladder, and liver, reducing inflammation in those organs and acting favorably upon the stomach.

GUN LOCK.—William N. Bennett, of Illyria, Iowa.—This invention is a new trigger mechanism which can be used like a plain trigger, or set to constitute a hair trigger, as may be desired. It consists in connecting the main trigger by a slotted arm and pin with the discharge lever so that it will swing said lever plainly for an ordinary discharge, or first lock and then suddenly release it for more accurate firing.

COVER FOR THE LENS OF PHOTOGRAPHIC CAMERA.—Oscar W. Noble, of Darlington, Wis., assignor to himself and Luke Agur, of same place.—This invention relates to covers for lenses of photographing apparatus; and consists in the application of hinged caps to photographic cameras for the purpose of covering and uncovering the lenses. An arrangement of an arm an arbor, ears, cranks, rod, crank, and handle, is employed, whereby the caps are operated through the turning of a crank to immediately and simultaneously open or close the caps when desired.

MACHINE FOR CUTTING CLOTH.—Ephraim B. Wells, of New York city.—An important improvement in textile manufacturing is that of Ephraim B. Wells, of New York city, an improved machine for cutting cloth. In this machine two drums are mounted, respectively, upon horizontal shafts which hang in horizontal frames, pivoted to an upright post of the main frame. The drums are in line with each other, and serve to hold an endless band or belt, made of thin metal, with projecting lancet shaped cutters that are sharpened at one or both edges. The back ends of the frames are connected with each other by a rod, carrying a nut, and a spring or piece of rubber, under the nut. The nut and rod serve to hold the band tense, and the spring gives it the requisite degree of elasticity. A projecting arm carries a grooved wheel, in which the band is guided to prevent swinging. The platform on which the cloth is supported is of circular form, and is surrounded by an annular platform, which is, by wheels, supported on a lower projecting flange of the first named platform, so that it can be turned around. Both platforms are slotted to permit the removal and application of the band. The cloth to be cut is placed upon the first named platform and fed against the continuous cutter in the requisite direction; it then arrives in rear of the cutter, where it is, in part, supported by the ring platform, and can be readily be brought in front of the cutter by turning the ring. This avoids to a great extent, the labor of bodily carrying the cloth to the front, such labor being, at times, considerable when the cloth in its several thicknesses weighs one hundred pounds or more. At the sides of the cutter are fastened, to the supporting platform, small metal plates, which have a slight lateral play, being slotted where the fastening pins pass through them. These plates line the slot above mentioned in the platform just in line with the cutter, and yield slightly to the side whenever some cloth is dragged down into the slot by the cutter. They therefore prevent the clogging of the machine.

WATER WHEEL.—J. Bell, of Carrollton, Mo.—This is a vertical wheel, running in a vertical trunk or cylinder. The wheel consists of a shaft running on a suitable step. A spiral web passes down this shaft, the pitch of the web being varied according to the head. At proper intervals along this web, project from the web, buckets, the space underneath the buckets being filled up with wood. The water passes into the upper part of the trunk through inclined chutes and acts upon the buckets to turn the wheel.

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WASHING MACHINE.—William Clark, of Prairie Du Chien, Wis.—This machine consists of a cylinder attached to the axle of a one horse cart, to one of the wheels of which is fixed a gear, meshing into a pinion upon a central haft passing through the cylinder. This shaft actuates an endless wire netting which passes between rollers in the cylinder, and also the rollers, which may be plain or fluted. The clothes are put in so that the wire netting carries up the goods from suds previously put in, to and between the rollers, so that by driving the machine about, the clothes are alternately soaked in suds and squeezed between the rollers till cleansed. Then a plug being drawn out at the bottom of the cylinder the suds are drawn off, and the continued motion of the machine squeezes out the water, and thus wrings the clothes dry.

RANGE SETTING.—Andrew F. Barry, of New York city.—The inventor proposes to have a wide cast metal plate, as high as the wall of the room, with a cornice at the top, an opening at the front for the range, and a register above the range for setting the latter, instead of the heavy and cumbersome brickwork now used. The plate will fit snugly against the wall at the edges and at the back of the cornice, but between the edges and the opening for the range it will swell outward by graceful curves, to the extent that it is desired to inclose the range. The front may be lined or grooved to represent stone or brick, or it may be ornamented in any approved way, and may have eyebolts or staples projecting from it at either or both sides of the range, near the floor, for the attachment of a bracket, for the support of the range boiler. The edges of the opening for the range may be formed in any way to match the walls of the range where they meet, to be lapped and bolted or otherwise for making close joints. It is claimed that these improved range settings may be afforded cheaper than the brickwork, can be much more readily put in, and will be more ornamental.

DRAWING BOARD.—J. B. Franklin, of New York city.—This invention provides drawing boards with concealed metallic stays or braces, whereby they are prevented from warping, and retained smooth when shrinking. The difficulty to be overcome consists chiefly in the necessity of keeping metal away from the surface of the board in order to permit the application of drawing pins. The invention consists in interposing metallic strips or braces between the hardwood edge pieces and the board in the dovetail grooves at the ends of the board, and also in the use, for large boards, of central hardwood cross pieces, lined at the edges with L shaped strips of metal. These pieces are let in to the body of the board, and act to hold the board from warping, as a piece dovetailed into the board would do. The entire board has nothing but wood on both surfaces, and can, therefore be used on either side.

GLOVE FASTENER.—Monroe B. Foote, of Northampton, Mass.—This is a new and improved fastener for gloves, mittens, and the like, applicable also for shoes and other articles. The invention consists in a metal or other disk, with two eccentric grooves or slots extending from opposite points near the periphery to points near the center, in such a way as to draw studs attached to the parts of the glove or other article to be fastened one toward the other, and hold them when turned in one direction, and push them in the opposite direction when turned the other way. The disk is made detachable from one of the studs for opening the parts more widely when relieved of the strain by the turning of it.

BUTTON.—George W. Phillips, of Fresh Pond, New York.—This invention relates to improvements in the construction of buttons for sleeves, bosoms, or other articles of wearing apparel; and consists in a front piece, of porcelain, metal, or other substance, with a shank having one end screw threaded and the other split for attaching to the said front piece of porcelain or other substance by driving into a hole having two opposite sides under cut for spreading and clinching the split shank, the screw threaded end of which is for attaching the disk for the back part of the completed button to it, said disk having a screw threaded socketed shank for screwing on to it.

ANIMAL POKE.—Nicholas Denny, of Saranac, Mich.—The bow of this poke passes around the animal's neck. The journals of the roller work in sockets or holes in the arms of the bow, in such a position as to leave a suitable space for the animal's neck between its upper side and the top or bend of the bow. The tail or bar of the yoke is pivoted to the upper or forward part of the roller. To the bar is attached a curved plate, which is forked or branched to form prongs or prickers, which pass up in an inclined direction through holes in the roller, in such position that, should the animal press the bar against a fence or other object, the prongs or prickers will be forced out against his neck and thus stop him. A spring, one end of which is attached to the roller, and the other or free end of which rests against the inner side of the plate, is made of such strength as to support the bar when raised from the ground and keep its weight from forcing the prongs or prickers out against the animal's neck.

TREMOLO FOR ORGANS AND MELODEONS.—John R. Lomas, of New Haven, Conn., assignor to B. Shoninger, of same place.—This invention removes the strain from the shaft of the wind wheel, and overcomes the consequent friction and rattling noise produced when such wheel is connected with an oscillating wing or fan which acts as a tremolo for an organ or melodeon. The invention consists in the use of two wings or fans, which are connected with opposite cranks, and therefore vibrated in opposite directions, so that one will balance the other, thus keeping an even strain on the power applied, making it work with ease, without noise, and, it is claimed, producing a perfect tremolo and beautiful effect on the music.

CONSTRUCTION OF DIES FOR FORMING THE LIPS OF AUGER BITS.—Richard N. Watrous, of Elmira, N. Y., assignor to himself and W. W. Kellogg, of same place.—A block of steel suitable for the die required is so shaped at the striking surface as to constitute the die for forming the lip and head of an auger. Into the striking face of the die is bored a hole, preferably of slightly conical form, into which is inserted a steel pintle, of tapering form. At the end of the pintle is formed a pin or projection, which gives form to the inside of the lip or cut of the auger. A hole is bored into the opposite end of the die to permit the removal of the pintle by the insertion of a rod. The advantages of this arrangement are claimed to be manifold. The die and pintle can be tempered separately. The die, having to withstand the blow or pressure, must be very hard in order to be durable, while the pintle must have a spring temper to prevent breaking. Should the projecting pin break, which it is liable to do, a new pintle can be inserted without great cost, while heretofore the entire die would have to be made anew. Both dies of a pair are or may be provided with such removable pintles.

DRINKING FOUNTAIN FOR FOWLS.—John S. Orndorff, of Virginia City, Nevada.—A vessel with a cover, having a concentric series of holes, through which fowls may drink, but which prevents their getting into the water, has water placed therein, and in the center is inverted a vessel with a narrow mouth, previously filled with water. When the water in the first named vessel is exhausted, so that air can pass under the mouth of the inverted vessel, a portion of the water in the latter descends, and thus keeps up the supply.

MOLDBOARD FOR PLOWS.—George Peacock, Selma, Ala.—This invention has for its object to prevent soil from adhering to the moldboards of plows as they are drawn through it, and thus increasing their resistance to the draft animals, and necessitating frequent halts to enable the moldboards to be cleaned off. Supposing the cause of the adhering of soil to moldboards to be the formation of vacua between the earth and the clay by the great pressure of the one upon the other, the inventor has devised a mold board, having a corrugated, grooved, or ribbed exterior surface, and having also orifices made through it for the purpose of preventing the formation of such vacua.

WASHING MACHINE.—John Lawson, Humboldt, Kansas.—This invention relates to a cylindrical tub, supported in a horizontal position upon legs, the upper half of the tub being removable and serving as a cover, and the lower half being lined with a corrugated zinc plate, and a semi-cylindric rubber, also corrugated, being placed within the tub, supported upon an axis, and vibratory with respect to the corrugated bottom.

BEEFSTEAK MANGLE.—Dr. John Locke, Lewisburg, Pa.—This invention relates to a beef steak mangle, in which there are two serrated toothed cylinders placed side by side, between which the steak to be mangled is passed, the stays that support said cylinders not coming together at their outer ends, but being at an interval, which is opposite the space between the two cylinders, wide enough to permit part of the steak to pass through it when the whole cannot pass between the two cylinders.

TELLURIAN.—Joseph Troll, of Belleville, Ill.—This invention relates to improvements in tellurians, and consists in the arrangement of parts for illustrating the inclination of the earth's axis, for disengaging the lunar globe from the terrestrial, and in the apparatus as a whole, whereby is secured, by simple and inexpensive means, what has hitherto required complicated and costly ones. The operation of the parts composing the train results in imparting to the entire daily and monthly train a rotation in a vertical plane about the sun globe; and the obliquity of the moon's orbit is indicated. The axis of the earth globe is jointed, for the purpose of illustrating the inclination of the earth's axis upon the ecliptic, which causes the change of seasons on the earth. The whole daily and monthly trains move about the sun by means of an automatic motor—as watchwork—or by hand, which better adapts the application for use in both schools and lecture rooms; the axis of the earth is shown inclined; the horizon both fixed and movable; and the lunar globe may be easily thrown out of action when it is desired to illustrate the movement of the earth alone.

FISH HOOK HOLDER.—Levi Arnold, Belchertown, Mass.—This is an improvement in the mode of securing fish hooks to fish lines or holders, and consists in a grooved stem and ring slide, arranged to operate in connection. The line holder is of the form well known and in use. A stem is rigidly attached to the line or line holder. This stem is grooved to receive one or more hooks, and is made tapering or larger in diameter at its outer end than it is where it is joined to the line holder. At the end of the stem the groove or grooves are designed to be sufficiently deep to receive the stem or stems of the fish hooks. A sliding ring is placed on the stem. This ring is put on before the stem is attached to the line holder, its interior diameter being less than that of the outer end of the stem. When the ring is slipped back on to the small portion of the stem, the "flat" of the hook or hooks may be inserted within the ring, and then the ring and the hooks are slipped up until the ring comes in contact with the stem. In this position the "flat" prevents the hook from being withdrawn from the ring. A weight on the hook serves to tighten instead of loosen the slide.

SOLDERING APPARATUS.—Jacob Gulden, Keyport, N. J.—The can to be soldered is secured on a revolving plate, being held thereon by a spring presser foot, which also serves to hold in place the top which is to be soldered. The soldering iron is attached to a box or chamber in which a gas flame constantly maintains the necessary heat. The chamber and its attached soldering iron are held at a short distance from the work by suitable spring mechanism. The can being placed in position, the soldering iron is held down to the work by operating a foot treadle, and solder being placed at the point of contact, the revolving can is at once rapidly and neatly soldered.

BOOT STRETCHER.—J. Hoffman, Belvidere, N. J.—This instrument consists of a sole piece, from the heel of which rises an angular support, through the top of which descends a screw which presses upon the end of a lever having its fulcrum upon the upper surface of the sole piece. The end of the lever opposite the screw carries a metallic piece to stretch the leather when the lever is operated as described. There are two fulcrums upon the sole piece, one nearer the heel than the other, a short lever being put in the latter for stretching the instep. And also various lengths of levers may be used to stretch any particular part of the boot.

ICE ELEVATOR.—John J. Neuman, Middletown, Ohio.—This invention is an improvement in machinery for elevating ice from the water and delivering it to a chute or other conductor. It consists in an endless machine chain arranged on drums having perpendicular projections at suitable distances along it, one at each end of a strong frame, having bottom rails for the blocks of ice to draw up on and side rails to control it, which frame is connected at one end by hinges or hooks and eyes with the end of a chute or other conductor, and the other end is suspended in the water, so that the blocks of ice being floated against the chain will be caught by the projections, raised out of the water by the chain, and delivered to the chute, the chain being worked by suitable gearing applied to the upper drum.

BURIAL CASKETS.—J. Owen Moore, of Albany, N. Y.—This invention has for its object to make burial caskets or coffins which will not inclose or "box up" the corpse as long as the same is to be exposed, but will leave it entirely open to view from all sides, and which can be readily closed to form receptacles in which the corpse can be buried. The invention consists in hinging the sides and one of the ends of the coffin to the bottom of the same, and in hinging the cover to the sides, so that sides, ends, and cover can be let down to about a level with or below the bottom to fully expose the corpse in the latter. The corpse will then appear as lying on a sort of ornamental couch, producing thereby an effect far less gloomy and depressing than when partly boxed up ready for the grave. When the coffin is to be closed the sides and ends are swung up and the cover folded off the sides, suitable catches being used to hold the parts together. The disagreeable process of securing the lid down by means of screws is thus also avoided. One end of the casket may be rigidly affixed to the bottom so that it will remain in an upright position to support the grillon.

FARMER'S BOILER OR CALDRON.—This is a combination of a large kettle or caldron with a furnace and jacket for heating, so arranged that the caldron can be easily dumped, when it is desired to remove its contents. The furnace is provided at the upper end with a jacket which directs the heated gases and flame from the firebox up around the kettle, so as to effectively heat its contents. A portion of this jacket is made so that it slides backward out of the way when the kettle is to be dumped. The kettle is hung on trunnions, from which descend arms which engage the sliding part of the jacket when the kettle is turned upon the trunnions, and thus push this portion of the jacket downward and backward out of the way. The kettle is provided with a cover, having a spout and strainer. This is a good practical improvement which adds much to the convenience of such apparatus. George H. Buckley, of Quincy, Ill., is the inventor.

MACHINE FOR POINTING HORSE SHOE NAILS.—Harry A. Willis, of Vergennes, Vt.—An intermittingly rotating carrying, holding, and delivering disk, of metal, with notches in the periphery, works on a horizontal axis in front of a set of four hammering dies, under a guard, and behind a guard. This disk is geared with a vertical shaft extending downward, and having a ratchet wheel on the lower end, with which a pawl works to impart one movement to the disk for each revolution of the driving shaft by which the pawl is worked through the medium of a lever and tappet. The nails, being previously roughly shaped, are put in the notches under one guard, and pointing to ward the hammers by hand, or any competent feeding mechanism; so that the heads will pass in front of the other guard, by which guards they are so confined in the notches as to be readily carried to the hammers and held for being acted on by them. The hammers are operated by a tappet wheel, whereon the tappets are so arranged that the hammers will be at rest, both when the nail is being carried to the position for being acted on by them, and when being carried away. After being hammered on the sides and edges, the nails are carried down and delivered into slots in a horizontally and intermittingly revolving disk on the vertical shaft, working over another fixed disk, said slots being suitably shaped to receive the heads of the nails at the inner ends, while the points project beyond the disk as much or a little more than the distance from the point it is required to hammer them. These slots are arranged relatively to the notches of the previous disks, and the two disks are so geared together that a slot will always be ready to receive a nail from the first disk as soon as the nail passes beyond the guards and falls out. This disk, working intermittently, carries the nails first over an anvil, where they are hammered by a die, and then over a pointing die, through which they are forced by a punch, by which and the said die, the edges are trimmed off, and the nails are then discharged.

MACHINE FOR THE MAMUFACTURE OF SOLDER, PRINTERS' LEADS, ETC.—Reuben Painter, Baltimore, Md.—This invention relates to a machine in which metals for the manufacture of solders, printers' leads, etc., are melted and stirred together while melting, and are drawn off from the melting pot through a tube having an adjustable feed apparatus, from which the compound is drawn off into circumferential grooves in a revolving wheel, within which grooves the compound is pressed by a flanged roller above, and also cooled by means of cold water introduced within an annular closed box cast in the rim of the wheel next to the grooves therein, the compound being sent out of the grooves by means of spring scrapers fitting in the latter, and passed through a cutting apparatus, wherein it is divided into pieces of suitable length, being then a marketable commodity.

WOODEN PAVEMENT.—James F. Gyles, Chicago, Ill.—This invention relates to a pavement whose foundation consists of boards or planks laid at intervals of an inch, more or less, crosswise of the street upon the ordinary sand bed, and whose rows of blocks are also laid crosswise of the street upon the board foundation directly above the intervals thereof, each row of blocks being furnished with a longitudinal rib, running centrally of one side and armed with projecting nails which extend into the ribless side of the next row of blocks, when the latter are driven up against the aforesaid rib by which construction there are created two longitudinal spaces between every two adjacent rows of blocks, of which spaces the upper is to be filled with a novel concrete of Mr. Gyles' invention, and the lower is to be left open for drainage into the gutters at the sides of the streets.

ELECTRIC INSTRUMENT.—L. L. Duerden, of Brooklyn, N. Y.—This instrument may either be used as a toy for children or as a sounding instrument for telegraphing. By a suitable arrangement of parts, an armature may be caused to vibrate without interruption when the proper cups are attached to the battery. By another mode of connecting the wires, however, the armature may be made to vibrate or strike at the desired intervals for transmitting messages. An arm carrying a hammer projects upward from the armature, which, striking against a sonorous body of any suitable character, gives the required sound. The armature tilts on its point of contact with the surface of the magnet, and has no lateral pivot as heretofore used. The friction of the pivots is thus avoided, the magnet moving on a spring support and moving easily on account of the flexibility of the spring.

BLOWER FOR CHIMNEY STACK.—Nathaniel L. Blanchard, of Spuyten Duyvil, New York.—The shaft of a fan blower is supported by the chimney or casing, and is placed one side of the center, or in a position where the wings just clear the cylinder on one side, and leave a broad opening on the other side. As the wings revolve, there is a constantly increasing current of the smoke and gases, the strength of which depends on the velocity with which the blower is revolved. The blower is driven by a belt from any convenient portion of the revolving machinery. The inventor states that his experience has taught him that it is more advantageous to draw the smoke and gases from the fire box through the boiler flues than to force or push them, as is usually done; and that the simple fan blower, when properly arranged, answers the purpose admirably.

ICE PICK.—William T. Eames, of New York city, assignor to Leonard J. Haas, of same place.—This is an instrument for picking and breaking ice. It consists in a breaking and picking instrument composed of a hammer head with a steel point or pick at one end, and a handle with a socket containing a pointed steel instrument for driving into the ice by the hammer. This pointed instrument is adapted to be held in the hand, for driving into the ice by the hammer in such parts as cannot be reached by the pick; for instance, a piece of ice being dropped into the mouth of a pitcher, and having projections low down in the contracted part of the vessel requiring to be chipped off to admit the piece, and that cannot be reached by the point, may have them chipped off by the pointed instrument driven by the hammer. It is also desirable to employ the instrument in any case, as it will not cause small pieces to fly off as much as the pick, which cannot be guarded with sufficient accuracy, at each blow, to prevent chipping off the wall of the hole formerly made. As the tool is intended for use on the table, these considerations are important, and make the instrument more desirable than those having only the pick point.

BELLOWS.—Alfred F. Jones, New York city.—The object of this invention is to obtain an air and watertight top and bottom for bellows or similar instruments, and airtight joints at their edges. For this purpose the inner face and edge of the wooden top and bottom are lined with sheet metal, and form a projecting metallic flange at the edge. The metal lining effectually closes the pores of the wood, making it water and airtight, while the projecting flange admits of such an attachment of the flexible sides that an airtight joint will be produced.

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118,455.—ROTARY PUMP.—C. E. Hutson, St. Louis, Mo.
118,456.—WATCH KEY, ETC.—J. Jenner, Chicopee Falls, Mass

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REISSUES.

4,528.—EVAPORATING PAN.—F. G. Butler, Bellow's Falls, Vt.—Patent No. 112,319, dated March 7, 1871.
4,529.—RUBBER, ETC.—A. Charles, Pittsburgh, Pa.—Patent No. 13,258, dated April 4, 1871.
4,530.—STOVE.—Eddy, Corse & Co., Troy, N. Y.—Patent No. 35,564, dated June 10, 1862; reissue No. 2,709, dated July 30, 1867.
4,531.—EVAPORATING, ETC.—T. W. Johnson, Jr., A. W. Goodell, Windsor, Nova Scotia.—Patent No. 108,793, dated November 1, 1870.
4,532.—TELEGRAPH.—G. Little, Rutherford Park, N. J.—Patent No. 108,496, dated October 18, 1870.
4,533.—PLOW.—J. C. Pfeil, Arenzville, Ill.—Patent No. 76,343, dated April 7, 1868.
4,534.—BUFFING LEATHER, ETC.—A. W. Pratt, Salem, Mass.—Patent No. 89,789, dated May 4, 1869.
4,535.—GENERATOR.—R. E Rogers, J. Black, Phila., Pa.—Patent No. 65,281, dated May 28, 1867.
4,536.—SUGAR.—M. L. Senderling, Jersey City, N. J.—Patent No. 60,797, dated January 1, 1867.
4,537.—Division A.—EDGE TOOLS, ETC.—The Collins Company, Collinsville, Conn.—Patent No. 30,668, dated Nov. 20, 1860.
4,538.—Division B.—EDGE TOOLS, ETC.—The Collins Company, Collinsville, Conn.—Patent No. 30,668, dated Nov. 20, 1860.
4,539.—WATER WHEEL.—J. Tyler, West Lebanon, N. H.—Patent No. 15,309, dated July 8, 1856; reissue No. 3,015, dated June 30, 1868; extended seven years.
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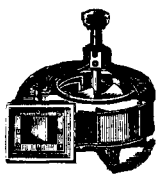

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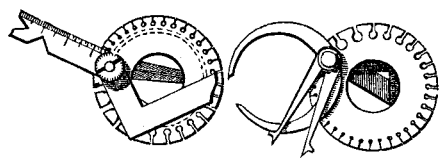

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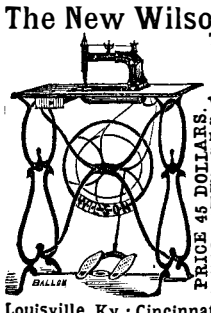

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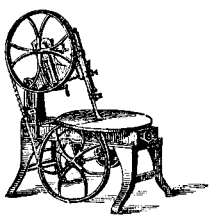

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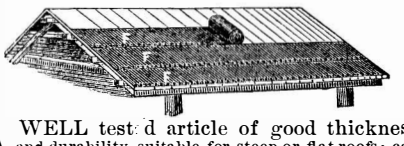

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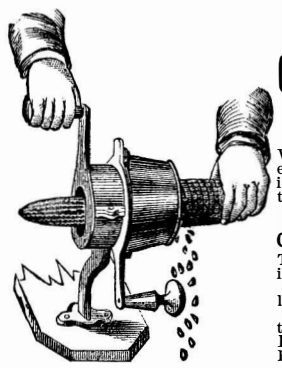

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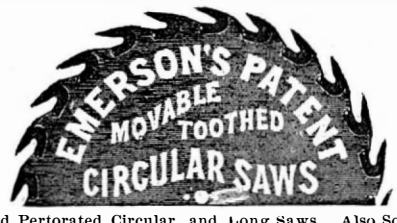

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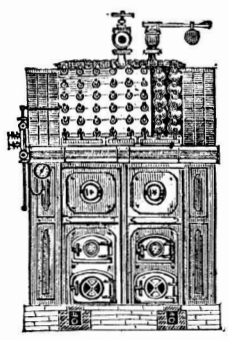

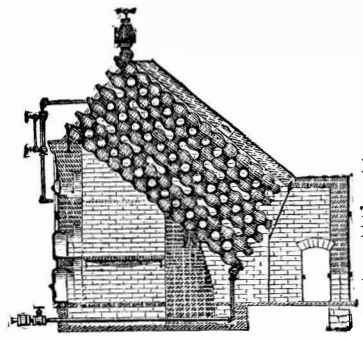

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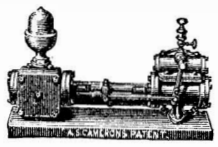

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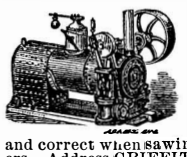

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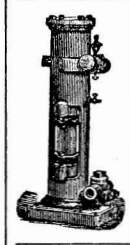

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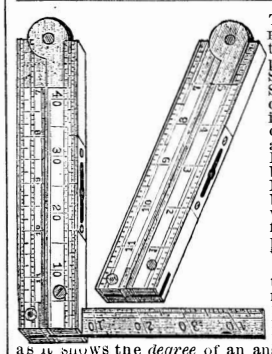

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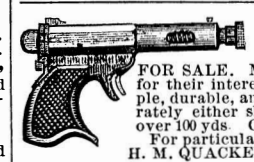

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